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Recent Literature on Waves, Currents and Swell, p. 472

9 April 1958 No. 4

METEOROLOGICAL ABSTRACTS AND BIBLIOGRAPHY

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ADMINISTRATIVE OFFICE: American Meteorological Society, Office of Executive Secretary, 3 Joy Street, Boston 8, Mass.

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METEOROLOGICAL ABSTRACTS AND BIBLIOGRAPHY is a monthly publication devoted to:

A. Current Abstracts in English on important meteorological literature in every language.

B. Bibliographic references to other items of interest to the profession.

C. Selective, annotated bibliographies on subjects of immediate and special interest to meteorologists.

SUBSCRIPTION RATE: $8.00 per year to members and non members. Single and back issues $3.00. Back volumes, $10 per volume.

This publication has been made possible through support and sponsorship extended by the Geophysics Research Directorate of the Air Force Cambridge Research Center, Air Research and Development Command, under Contract No. A. F. 19 (604)-2062.

METEOROLOGICAL ABSTRACTS AND BIBLIOGRAPHY

MALCOLM RIGBY, Editor

Vol. 9 APRIL 1958 No. 4

SPECIAL FEATURE IN THIS ISSUE

Recent Literature on Waves, Currents and Swell

By
Mary L. Rice

(*For complete table of contents see back cover*)

Published monthly at Prince and Lemon Streets, Lancaster, Pa., by the AMERICAN METEOROLOGICAL SOCIETY, 3 Joy Street, Boston 8, Mass.

Printed and issued by: Lancaster Press, Inc.

LIST OF PERIODICALS

Note: This list contains the titles of the periodicals which regularly contain material on meteorology or related fields and it comprises only a small percentage of the periodicals from which pertinent articles are abstracted. The form of serial entry adopted by MAB is given in bold face type below.

PERIODICALS IN WHICH METEOROLOGICAL ARTICLES REGULARLY APPEAR

★**Acta Geophysica Polonica,** [Warsaw].
Akademiia Nauk SSSR, Izvestiia, Ser. Geogr. and **Ser. Geofiz.,** [Moscow].
American Geophysical Union, Transactions, [Washington].
★**American Meteorological Society, Bulletin,** [Boston].
★**Angewandte Meteorologie,** [Potsdam].
Annales de Géophysique, Centre National de la Recherche Scientifique, [Paris].
★**Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. A and Ser. B,** [Vienna].
Australian Journal of Physics, [Melbourne].
★**Australian Meteorological Magazine,** [Melbourne].
★**Ciel et Terre,** Société Belge d'Astronomie, Météorologie et Physique du Globe, [Brussels].
★**Geofisica e Meteorologia,** Società Italiana di Geofisica, [Genoa].
Geofisica Pura e Applicata, Istituto Geofisico Italiano, [Milan].
★**Geophysical Magazine,** Japan Meteorological Agency, [Tokyo].
Hemel en Dampkring, [The Hague].
★**Időjárás,** Magyar Meteorólogiai Társaság and Országos Meteorológiai Intézet, [Budapest].
★**Indian Journal of Meteorology and Geophysics,** [Delhi].
★**Journal of Atmospheric and Terrestrial Physics,** [London].
Journal of Geophysical Research, [Washington].
★**Journal of Meteorological Research,** [Tokyo].
★**Journal of Meteorology,** American Meteorological Society, [Boston].
★**Journal Scientifique de la Météorologie,** Société Météorologique de France, [Paris].
★**The Marine Observer,** Air Ministry, Meteorological Office, London.
★**The Meteorological Magazine,** Air Ministry, Meteorological Office, London.
★**Meteorologické Zprávy** [Prague].
★**Meteorological Society of Japan, Journal,** [Tokyo].
★**La Météorologie,** Société Météorologique de France, [Paris].
★**Meteorologiia i Gidrologiia,** [Leningrad].
★**Meteorologische Rundschau,** [Berlin].
★**Monthly Weather Review,** U. S. Weather Bureau, Washington, D. C.
Polarforschung, Archiv für Polarforschung, [Kiel].
★**Przegląd Meteorologiczny i Hydrologiczny,** [Warsaw].
Revista de Geofísica, Instituto Nacional de Geofisica, [Madrid].
★**Revista Meteorologica,** Junta Nacional de Meteorología, Montevideo.
★**Rivista di Meteorologia Aeronautica,** Servizio Meteorologico, [Rome].
★**Royal Meteorological Society, Quarterly Journal,** [London].
★**South Africa, Weather Bureau, Notos,** [Pretoria].
★**Tellus,** Svenska Geofysiska Föreningen, Stockholm.
Vsesoiuznoe Geograficheskoe Obshchestvo, SSSR, Izvestiia, [Leningrad].
★**Weather,** Royal Meteorological Society, [London].
★**Weatherwise,** American Meteorological Society, [Boston].
★**Wetter und Leben,** Österreichische Gesellschaft für Meteorologie, [Vienna].
★**WMO Bulletin,** World Meteorological Organization, [Geneva].
★**Zeitschrift für Meteorologie,** Meteorologisches Observatorium, Potsdam.

★ Indicates those periodicals which are primarily meteorological.

FOREWORD

Meteorological Abstracts and Bibliography is a monthly publication whose purpose is to bring to the attention of meteorologists current literature in their field and in related fields and to provide bibliographic information on various subjects, as interest demands.

Part I contains abstracts of current literature in the fields of meteorology, oceanography, etc., arranged according to the Universal Decimal Classification.

Part II of each issue comprises an annotated bibliography of important references on a special subject (usually arranged chronologically). No attempt is made to prepare exhaustive bibliographies; instead, the aim is to include a representative cross section of the various aspects of a subject.

Bibliographies published in the successive issues were:

Vol. I, 1950

1. Atmos. Pollution	2. Aerobiology	3. Cloud Physics	4. Hail
5. Tornadoes	6. Volcanic Dust	7. Climat. Changes	8. Thunderstorms
9. Icing	10. Acoust. Propagation	11. Evaporation	

Vol. II, 1951

1. Extended Forecast.	2. Long Range Forecast.	3. Soil Temp.	4. Constants, etc.
5. Clim. of Near East	6. Clim. of Middle East	7. Special Winds	8. Radar Storm Detect.
9. Condensation Trails	10. Clim. of N.E. Africa	11. Mountain Met.	

Vol. III, 1952

1. Clim. of N.W. Africa	2. Carbon Dioxide	3. Clim. of Argentina, etc.	4. Dew
5. Objective Forecast.	6. Stratus Forecast.	7. Urban Climatology	8. Clim. of C. Africa
9. Visibility	10. Glaze and Rime	11. Free Air Turbulence	

Vol. IV, 1953

1. Turbulence Theory	2. Turbulent Diffusion	3. Frost	4. Clim. of Australia, etc.
5. High Level Winds	6. Winds in Stratosphere	7. Jet Stream	8. Radiation Bioclim.
9. Clim. of Pacific	10. Auroras	11. Sferics	

Vol. V, 1954

1. Oceanog. Met.	2. Clim. of S.E. Asia	3. Auroral Physics	4. Tropopause
5. Balloons	6. Numerical Forecast.	7. Radiation Data	8. Vertical Motion
9. Clim. of Arctic	10. Industrial Met.	11. Wind Waves and Swell	

Vol. VI, 1955

1. Bibliog. of Bibliog.	2. Texts & Monogr. Bibliogs.	3. Storm Surges	
4. Ionospheric Prop.	5. Photochem.—Upper Atmos.	6. Cloud Physics	
7. Radar Cloud Physics	8–9. Atmos. Nuclei	10. Weather Modification	11. Cooling Power

Vol. VII, 1956

1. Synoptic Met.-Arctic	2. Clim. of Enclosed Spaces	3. Cosmic Rays (–1952)
4. Cosmic Rays (1953–56)	5. Atmos. Radioactivity	6. Inversions
7. Snow Micromet.	8. Snow Micromet. (Suppl.)	9–11. Tropical Cyclones

Vol. VIII, 1957

1. Solar Weather Relations	2. Night Airglow	3. Forecasting Special Elements
4. Forest Micrometeorology	5. Hydromet. Forecasting	6. Numerical Forecasting (Suppl.)
7. Albedo 8. Meteors	9–10. Tropospheric Propagation	11. Medical Meteorology

Vol. IX, 1958

1. Radioastronomy	2. Solar Astrophysics	3. Radioactivity in Atmosphere
4. Waves and Currents		

Other bibliographies in preparation are:

Actinometers	*Long Range Forecasting*	*Radar Meteorology*
Geomagnetism	*Ozone*	*Singularities*
High Atmosphere Temperatures	*Physical Oceanography*	*Synoptic Aerology*

Part III contains a listing of reviews, translations, reprints, and the contents of important publications. These are published in the earliest issue where space permits.

Part IV is made up of author, subject and geographical indexes. The December issue comprises cumulative author, subject, geographical and journal indexes.

EXPLANATIONS

Location of material: For each entry, a symbol is given for at least one library where the material may be found. The Union List of Serials (Gregory) is the source of most of the symbols used. In some cases, where no symbol has been assigned to a library, one will be devised according to the principles of the Union List.

Library symbols used frequently may be found in the following list:

DA:	U. S. Dept. of Agriculture Library, Washington, D. C.
DBS:	U. S. Bureau of Standards Library, Washington, D. C.
DGS:	U. S. Geological Survey Library, Washington, D. C.
DLC:	Library of Congress, Washington, D. C.
DN-HO:	U. S. Navy Hydrographic Office Library, Suitland, Md.
DNLM:	U. S. National Library of Medicine, Washington, D. C.
DSI:	Smithsonian Institution Library, Washington, D. C.
DWB:	U. S. Weather Bureau Library, Washington, D. C.
GB-MO:	Great Britain, Meteorological Office Library, Harrow, England.
MH-BH:	Harvard University, Blue Hill Observatory Library, Milton, Mass.

Other symbols:

*	before an entry indicates a good data source.
†	before an entry indicates a good bibliography.
§	before an entry indicates a synoptic case history study accompanied by charts.

Geographic locations are in the English form rather than the form used locally, for example Moscow for Moskva.

Titles of articles or monographs are in the language of the original article unless otherwise stated. Slavic (Cyrillic) titles are transliterated into the Roman alphabet according to the Library of Congress transliteration scheme.

Abbreviations:

Titles of periodicals are not abbreviated, as a rule.

The months of the year from March to July are not abbreviated. Other months are abbreviated as Jan., Feb., Aug., Sept., Oct., Nov., and Dec.

The word or abbreviation for Volume (Tom, Band, Jahrgang, Año, etc.), for Number (Heft, Fascicule, Vypusk, etc.) and for page or pages is omitted from most entries. Thus an entry will read as follows:

Meteorologische Rundschau, 2(5/6):146–151, May/June 1950.

This indicates that the article appeared in *Meteorologische Rundschau*, *Jahrgang* 2 (Vol. 2), *Heft* 5/6 (No. 5/6), *pages* 146–151, May/June 1950.

PART I. ABSTRACTS OF CURRENT METEOROLOGICAL MATERIAL

MAJOR GENERAL WORKS

COLLECTED WORKS

9.4–1 551.5:048

†Blackadar, Alfred K. (*ed.*), **Meteorological research reviews: summaries of progress from 1951 to 1955, by H. E. Landsberg et al.** *Meteorological Monographs* (American Meteorological Society), Boston, 3(12–20), July **1957.** 283 p. figs., tables, bibliogs., eqs. **DWB, DLC**—This collection of 9 reviews or survey articles on various aspects of climatology and meteorology such as were covered in the **Compendium of Meteorology,** actually brings up to date the knowledge and progress in the several fields covered since 1950: climatology; instruments; radiometeorology; observations, analysis, and forecasting; applied meteorology; physics of the upper atmosphere; cloud physics, precipitation physics, and atmospheric electricity. Each article is of the quality of the **Compendium** articles, being systematically organized and with an outline and a comprehensive bibliography of recent works. A good subject index for the entire volume is appended. (For listing of contents, *see* p. 110, Jan. 1958, *MAB.* Articles abstracted separately.) *Subject Headings:* **1. Compendium supplement 2. Review articles. I. Landsberg, H. E.**—*M.R.*

9.4–2 551.5:6

Russell, J. A., (*ed.*), **Industrial operations under extremes of weather, by J. A. Russell, W. W. Hay et al.** Foreword by Helmut E. Landsberg. *Meteorological Monographs* (American Meteorological Society), Boston, Vol. 2, No. 9, May **1957.** 121 p. figs., tables, bibliogs. **DWB, DLC**—An attempt to apply the principles of "Operations analysis" to problems of railroad operation, heavy construction, electric power, water supply, petroleum and steel refining, etc. with special reference to extreme climatic factors or weather influences, is presented in an organized manner in this series of 9 studies made under the sponsorship of the Air Force Cambridge Research Center and the Univ. of Illinois. SAMUEL SOLOT of AFCRC, JOHN L. PAGE and LEO ALPERT were responsible for supervision and organization of the project. The contributing authors included J. W. WATERS, A. W. BOOTH, E. F. TAYLOR, H. E. HUDSON, W. J. ROBERTS, J. T. STALL and J. ABU-LUGHOD. (For listing of contents, *see* p. 110, Jan. 1958, *MAB.*) *Subject Headings:* **1. Industrial meteorology 2. Weather effects on industry. I. Hay, W. W.**—*M.R.*

9.4–3 551.574.1:061.3

Conference on the Physics of Cloud and Precipitation Particles, Woods Hole Oceanographic Institution, Sept. 7–10, 1955, **Artificial Stimulation of rain: Proceedings of the First Conference.** . . . Sponsored by the Geophysics Research Directorate, Air Force Cambridge Research Center, Air Research and Development Command, and the Geophysics Branch, Office of Naval Research, N. Y., Symposium Publications Div., Pergamon Press, **1957.** 427 p. figs., tables, refs., eqs. throughout. Price: $15.00. Articles abstracted separately. (For listing of contents, *see* Pt. III of this issue.) **DLC** (QC921.5.U5)—Review by F. H. Ludlam in *Royal Met. Soc., Quarterly Journal,* 84(359):84, Jan. 1958. *Subject Headings:* **1. Cloud physics conferences. I. U. S. Air Force. Cambridge Research Center. Geophysics Research Directorate II. U. S. Office of Naval Research III. Artificial stimulation of rain IV. Smith, Waldo** (*ed.*) **V. Weickmann, Helmut** (*ed.*).

TEXTBOOKS

See also: **Avalanches and skiing hazards** (Schweizerische Geotech. Komm.), 9.4–216.

9.4–4 551.58:519.24(02)

Drozdov, O. A., **Osnovy klimatologicheskoĭ obrabotki meteorologicheskikh nabliudeniĭ.** [Principles of climatological analysis of meteorological observations.] Leningrad, Izdatel'stvo Leningradskogo Universiteta, **1956.** 301 p. 53+5 tables, 79 figs., 121 eqs. At head of t-p: Leningradskii Gosudarstvennyĭ Universitet. **DLC** (QC861.D8)—A systematic text or handbook giving the theory and practical examples of the use of statistical and graphical methods for working up or analyzing meteorological observations for climatological purposes. The 38 parts of the text are divided into 8 chapters: 1) climatology, methodology, and sources of data; 2) structure of meteorological variables; 3) methods of smoothing, analysis of periodicity or rhythm; 4) homogeneity of meteorological time series; 5) accuracy of means, curves of distribution; 6) adjusting a series to a given period (normal), short series extremes; 7) peculiarities of the various meteorological elements with respect to analysis; 8) cartography in climatology. The book treats of the classical methods of compiling the usual surface and upper air elements and does not pretend to go into the latest or most advanced statistical refinements. *Subject Headings:* **1. Statistical methods in climatology 2. Textbooks.**—*M.R.*

9.4–5 551.511(02) 551.509.313

*†Haltiner, George J. and Martin, Frank L. (*both, U. S. Naval Postgraduate School, Monterey, Calif.*), **Dynamical and physical meteorology.** N. Y., McGraw-Hill, **1957.** 470 p. tables, numerous figs. and eqs. Bibliog. at end of each ch. **DLC** (QC861.H12)—A basic text in dynamic (and to some extent physical) meteorology for university students majoring in meteorology. The 23 chapters cover: 1) vector notation and use, 2) thermodynamics of dry air, 3) moist air, 4) hydrostatics 5) convection and stability, 6) radiation in general, 7) solar radiation, 8) terrestrial radiation, 9) radiative balance and synoptic aspects involved, 10) earth-atmosphere mean heat balance, 11) equations of motion, 12) horizontal flow, 13) vertical wind and pressure variations, 14) wind structure near the ground, 15) diffusion of heat and moisture, 16) diffusion of pollutants in atmosphere, 17) frontogenesis, 18) discontinuity surfaces, 19) pressure change mechanism, 20) vorticity and circulation, 21) perturbation theory, 22) numerical forecasting and 23) general circulation. An advanced text such as this is essential for the many students who are going into numerical prediction and related synoptic analysis fields. Vector notation is used throughout the text. Many chapters have ample list of references to recent literature appended. *Subject Headings:* **1. Dynamic meteorology textbooks 2. Numerical forecasting 3. Textbooks.**—*M.R.*

9.4–6 551.5:63 711(02)

Higbee, Edward, **The American oasis: the land and its uses.** Foreword by Fairfield Osborn. N. Y., Alfred A. Knopf, **1957.** 259 p. 16 photos, 21 refs. **DWB** (630.973 H634am)—In a book on land use in the U. S. in general and in various farming regions of the U. S., Ch. 2 (p. 24–36), entitled **Dictates of climate,** deals with the effect of climate on agriculture and soil erosion and the regional, local and seasonal differences in rainfall, snow, heat, drought, etc. *Subject Headings:* **1. Land utilization textbooks 2. Climate and agriculture. I. Osborn, F.**—*M.R.*

9.4–7 551.511.32:532.5(02)

Milne-Thomson, Louis M., **Theoretical hydrodynamics.** 3d ed. London, Macmillan, **1955.** 632 p. numerous figs. and eqs. **DLC** (QA911.M5, 1955)—The third edition of this now classic textbook (first published in 1938) contains about 32 additional pages, mostly confined to 3 chapters (Ch. 9, **Moving cylinders;** Ch. 12, **Helmholtz motions** and Ch. 14, **Waves**). The remainder of the text has had some rearrangement and alteration, but the general order of the text is the same: 1) Bernoulli's equations, 2) vectors, 3) equations of motion, 4) 2-dimensional motion, 5) complex variables, 6) stream motions, 7) aerofoils, 8) sources and sinks, 9) moving cylinders, 10) Schwarz and Christoffel theory, 11) jets and currents, 12) Helmholtz motions, 13) rectilinear vortices, 14) waves, 15) Stokes stream function, 16) spheres and ellipsoids, 17) solid moving through a liquid, 18) vortex motion, 19) viscosity and 20) subsonic and supersonic flow. [*See* 8–37, Aug. 1950, *MAB* for 2nd ed. (1949).] *Subject Heading:* **Hydrodynamics textbooks.**—*M.R.*

9.4–8 591.9:572.9(02)

†Money, D. C., **Introduction to human geography.** London, University Tutorial Press, **1954.** 331 p. 114 figs., 32 photos, refs. at end of each ch. **DLC**—As part of man's interaction with his environment, the author considers the role of climate and of the individual meteorological variable. A general and brief discussion is given of the direct effect of climate and of the individual weather elements upon man and upon vegetation. The climagraph is described. More specifically, the book contains various illustrations of the manner in which regional climatic and weather conditions influence human life, occupations, manner of life, etc. *Subject Headings:* **1. Human geography 2. Climatology 3. Geography textbooks.**—*I.L.D.*

9.4–9 591.9:572.9(02)

Geography and man: a practical survey of the life and work of man in relation to his natural environment. Advisory editor, W. G. V. Balchin. 2d ed. London, New Era Pub. Co., **1955.** Vol. 1:73–95, **Climate and weather.** photos, figs.—**DLC**—In this voluminous and elaborately illustrated work on the human geography of the earth, there are several chapters dealing with physical geographic factors, one of them being climate. The basic ideas of meteorology—circulation, continentality, climatic zones, storms, hurricanes, monsoons, tornadoes, waterspouts, floods, visibility, rain, fog, dust, drought, etc.—are described in separate paragraphs and admirably illustrated by representative photographs of these occurrences in various parts of the world. Effect of climate on human activity, clothing, agriculture, housing, transport, climatic change and the Ice Age are also discussed. Climates of individual regions are discussed very briefly in each respective regional chapter. *Subject Headings:* **1. Human geography 2. Climate and man 3. Geography textbooks. I. Balchin, W. G. V.** *(ed.)*—*M.R.*

NEW SERIALS

9.4–10 550.3:019.941(05)

†**Referativnyĭ Zhurnal: Fizika, [Section] Geofizika,** Moscow (Abstracts Journal: Physics, Section Geophysics), No. 1, Jan. **1957.** Latest issue seen, No. 6, June **1957.** No. 3, items 1601–2650 (142 p.). Monthly. Issued by the Akademiia Nauk SSSR, Institut Nauchnoĭ Informatsii. General Editor of Physics Section, E. V. Shpolskiĭ. Price: 115.20 rubles. **DLC** (Slavic) (For abstract on whole Journal, *see* 6A–31, Jan. 1955, *and* 7C–5, Mar. 1956, *MAB.*) **DLC** (Slavic)—The Physics section of *Referativnyĭ Zhurnal* had, during 1956, 400–600 items per month on geophysics—over half of which were on meteorology in its various aspects. Beginning with Jan. 1957, the Geophysics section has been removed from the Physics section and issued as a separate series. It is also much expanded containing 800–1100 items a month. The subject breakdown is grouped under four major headings: 1. General, 2. Physics of Atmosphere, 3. Physics of Hydrosphere, 4. Physics of Earth. Under the General section are: effects of atomic explosions, IGY, history, biography, conferences, institutions, education, handbooks, and textbooks, use of solar energy, windpower, sea water energy, earth's heat and snow cover or glaciers. Under Physics of atmosphere are: Dynamics, synoptics, climatology, water, optics, atmospheric electricity, acoustics, and upper atmosphere—ionosphere. In the March 1957 issue, which had 1047 items, 63% were on meteorological subjects, 19% on hydrological (and oceanographic), and 18% on solid earth geophysics. Abstracts vary greatly in length and amount of technical information presented. Cross references and annotations as to reviews are ample. All standard scientific journals are covered. *Subject Headings:* **1. Geophysics abstracts 2. Meteorological abstracts 3. Referativnyĭ Zhurnal. I. Shpolskiĭ, E. V.** *(ed.)*.—*M.R.*

MONOGRAPHS AND COMPREHENSIVE PAPERS

See also: **WMO. Annual Report, 1956,** 9.4–26; **Oceanog. obs., Eastropic Exped.,** 9.4–35; **WMO maritime met. sessions,** 9.4–36; **Avalanches and skiing hazards** (Schweizerische Geotech. Komm.), 9.4–216.

9.4–11 551.584:551.524.7

†*Henning, Hubert, **Pico-aerologische Untersuchungen über Temperatur- und Windverhältnisse der bodennahen Schicht bis 10 m Höhe in Lindenberg.** [Pico-aerological investiga-

tions on the temperature and wind conditions in the air layer near the ground up to a height of 10 m at Lindenberg.] *Germany. Deutsche Demokratische Republik. Meteorologischer und Hydrologischer Dienst, Abhandlungen*, 6(42), **1957.** 66 p. 35 figs., 40 tables, 22 refs. **DWB**—A monograph in which the equipment and methods of measuring and recording temp. and wind on a microclimatic scale are critically reviewed on the basis of records obtained up to 75 m height for temp. and to 90 m height for wind at Lindenberg, but with emphasis on the lowest 10 m. Micrometeorological records made with automatic equipment, and extracted data, are presented in figures and tables throughout the work. Temp. measurements were made at 7 levels above the ground and 3 below the ground, with special resistance thermometers. Wind records were made with cup anemometers and with hot wire anemometers at 1 m above ground. Data analyzed are for April 1953–March 1954. Relationships between wind speeds (and calms) and temperature gradients are brought out graphically and statistically as well as the frequency distributions of lapse rates, winds, etc. for the various seasons, hours of the day, heights above ground, and weather types. Two radiation types (clear and cloudy) for day and for night, and two inversion types (calm and windy) are differentiated, discussed and illustrated in the analysis. *Subject Headings:* **1. Microclimatic wind and temperature studies 2. Pico-aerological research 3. Inversion studies 4. Lindenberg, Germany.**—*M.R.*

9.4–12 551.508.822:551.506.7

*Malet, L. M., **Comparaison régionale des radiosondes, Bruxelles, 4-XI-54–19-XI-54, Tome II A, Données relatives aux observations simultanées.** [Regional comparison of radiosondes, Brussels, Nov. 4–Nov. 19, 1954, Vol. 2, A, Data relative to the simultaneous observations.] *Belgium. Institut Royal Météorologique, Publications, Ser. A*, No. 3, **1955.** 71 p. entirely tables. **DWB, DLC**—Tables give simultaneous values of pressure, temp., humidity and height obtained every minute during the regional comparative ascents at Brussels on Nov. 6–18, 1954 with 5 different types of radiosondes 1) AN/AMT4, 2) KNMI-Philips, 3) Graw H50, 4) Kew MKII, and 5) Bendix 403 Mc/s. Several ascents were made a day on some of the days. *Subject Headings:* **1. Radiosonde comparison data 2. Brussels regional radiosonde comparisons.**—*M.R.*

9.4–13 551.582.1(668)

§Deneau, V., **Les singularités climatiques du Bas-Togo.** [Climatic singularities of lower Togo.] *France. Météorologie Nationale, Mémorial*, No. 42, **1956.** 32 p. 19 figs., charts, 9 refs. **DWB, DLC**—The characteristics of the climate, the seasons and the air masses of Togo (6°–11°N) are described and illustrated by schematic and synoptic charts, soundings and climograms. In the last section the weather elements (low cloud, fog, gales, hail and thunderstorms) dangerous for aviation are discussed. The main features of the climate are controlled by the double maximum of rainfall (April–July and Oct.–Nov.), a dry season of winter (Dec.–March) and a little dry season (July–Sept.) when Southern Hemisphere anticyclonic air prevails. No numerical data are presented. *Subject Headings:* **1. Climate of Togo 2. Togo, Africa.**—*M.R.*

9.4–14 625.03:631.4:551.573

Drexel Institute of Technology. Laboratory of Climatology, **Estimating soil tractionability from climatic data.** Drexel Institute of Technology, Laboratory of Climatology, Centerton, N. J. Contract AF (604)-1306, Final Report, Jan. 31, **1956.** 44 p. 5+tables, 3 eqs. **DWB**—A modified procedure to compute potential and actual evapotranspiration, runoff and soil moisture is described. The major improvements consider snow and ice, effect of soil moisture upon evapotranspiration; the available soil moisture range is changed from 100 to 300 mm. Sample computations and working tables are included. The concept of the "heat index" is still maintained. A. ÅNGSTRÖM in an appendix on **Evaporation and its relation to the stability of the air layers within the lower troposphere** introduces the tentative equation

$$PE = k \times 1.07^{T}\left(\frac{\beta}{10-\beta}\right).$$

PE = potential evapotranspiration; $k = 16.0$; T = absolute temperature; $\beta = \frac{\Delta T}{\Delta h}$—change of

temperature in the lower 1000 m. This approach seems to give better results than THORNTHWAITE's method in regions with frequent advection, as in Sweden. *Subject Headings:* **1. Evapotranspiration 2. Soil tractionability 3. United States. I. Thornthwaite, C. W. II. Ångström, A.**—*A.A.*

9.4–15 551.508.77:551.578.4:551.556

*Warnick, C. C., **Influence of wind on precipitation measurements at high altitudes.** *Idaho. Univ. Engineering Experiment Station, Bulletin*, No. 10, April **1956.** 63 p. 46 figs. (incl. photos), 8 tables, 36 refs. **DWB** (M77.59 W285i)—History of wind shields in rain and snow gages—wind tunnel used at Univ. of Idaho during 1948–55 for testing air flow over or around shielded snow gages of various types; data obtained from wind tunnel and field tests of shields; damage in 1952 to Shasta windshields installed at Mullan Pass, and to 6 gages installed in California illustrated; comparisons of accumulated precipitation and snow tube measurements at Mullan Pass, Idaho, in connection with wind speed, similar data obtained at Gisborne Mountain, Idaho; effect of wind and shields varies with type of snow (fine dry or heavy wet) are included. The Shasta wind shield was found to be superior for large gages and the Modified Alter III for small gages. *Subject Headings:* **1. Wind effects on snow gages 2. Shasta snow gage wind shield 3. Mullan Pass, Idaho.**—*M.R.*

9.4–16 551.593.54:551.508.21

*Schüepp, Walter, **Measurement of atmospheric turbidity and precipitable water with actinometers.** Léopoldville, Belgian Congo Meteorological Service, **1956.** 15 p. 15 figs., 13 tables, 18 refs. **DWB** (M21.12 S385m)—Numerous computation (correction, reduction, etc.) tables and nomograms are presented and their use discussed for the determination of the turbidity factor (β) and exponent (α) and the amount of precipitable water vapor in the atmosphere (W) from actinometric readings (with filters). The theory is briefly discussed, absorption by atmospheric gases (CO_2, O_3O_2, and H_2O) considered, determination coefficients and other reduction processes outlined in great detail for practical application, using two series of data from Léopoldville, Belgian Congo (Nov. 5, 1953 and July 18, 1953). *Subject Headings:* **1. Turbidity calculations from actinometric data. 2. Precipitable water calculations 3. Léopoldville, Belgian Congo.**—*M.R.*

ATLASES

9.4–17 551.542

Potter, J. G., **Monthly mean sea-level pressure maps for Canada.** *Canada. Meteorological Div., Cir.* 2710, Tec. 224, Oct. 18, **1955.** 11 p. 7 figs., 12 charts, 2 tables, 19 refs. **DWB**—Early attempts at Northern Hemisphere pressure charts (1869–1946) are reviewed, the methods used since 1874 of correcting barometers in Canada mentioned (the present method of reduction to sea level similar to BIGELOW's used in the U. S., has been current in Canada since 1932). Because of lack of uniformity in Canada before 1940 only data for 1940–49 are used in drawing the monthly mean sea level pressure maps included in this report. Statistical tests are applied and results presented in tables to show σ of values for 7 key stations for 4 months taken from these maps and from long period records. Features of each monthly map are described and profiles showing the annual variations in m.m. pressure at the 7 stations according to the two systems shown on graphs. Charts are nicely drawn on a colored background chart, with an interval of 2 mb between isobars. The chart included the Gulf of Alaska, Canadian Archipelago, New England and W. coast of Greenland. *Subject Headings:* **1. Monthly mean pressure charts 2. Canada.**—*M.R.*

POPULAR METEOROLOGY

See also: **Story of IGY** (Hyde), 9.4–24; **Shall we move to another planet?** (Stimson), 9.4–42.

9.4–18 91(98) 551.582.1(98)

Tolmachev, Aleksandr Innokent'evich, **Severnye poliarnye strany.** [North Polar lands.] 2d ed. Arkhangel'sk, Severnoe Kraevoe Izd-vo, **1935.** 136 p. photos, tables, map (fold.).

DLC (G590.T6)—A popular science book, giving information on the geology, climate, flora, fauna and settlements in the European, Asiatic and American sectors of the Arctic. The climate of the Arctic is discussed on p. 23–35, with tables indicating average conditions for 83–90°N, 82°N (Greenland) and 80°N (Franz Josef Land), and more detailed data for various places in the Soviet Arctic. The climate of individual regions is discussed briefly in the chapters on the major regions. *Subject Headings:* **1. Arctic geography 2. Arctic climates 3. Arctic.** —*M.R.*

9.4–19 551.582.1(99)

Buĭnitskiĭ, Viktor Kharlampievich, **Priroda Antarktiki.** [Nature of the Antarctic.] Leningrad, **1952.** 31 p. foot-refs. (At head of t-p: Vsesoiuznoe Obshchestvo po Rasprostraneniiu Politicheskikh i Nauchnykh Znaniĭ. Leningradskoe Otdelenie.) **DLC** (G860.B83) —This pamphlet treats the discovery, exploration, geography, geology, meteorology, snow and ice conditions, temperature regime, whale fisheries and political aspects of the Antarctic. *Subject Headings:* **1. Climate of the Antarctic 2. Popular meteorology 3. Antarctica.** —*M.R.*

GENERAL GEOPHYSICS AND METEOROLOGY

ARCTIC RESEARCH

See: **North Polar lands** (Tolmachev), **9.4–18**; **Radiation measurements, Greenland Ice cap** (Diamond, Gerfel), **9.4–141.**

ANTARCTIC RESEARCH

See also: **Nature of the Antarctic** (Buĭnitskiĭ), **9.4–19**; **IGY Antarctic program** (Sans Huelin), **9.4–23.**

9.4–20 551.582.1(99)

France. Direction de la Documentation, **Les terres australes et l'Antarctide Française.** [Southern lands and the French Antarctic.] Paris, Documentation Française, **1950.** 58 p. maps. Price: 165 fr. Its *Recueils et Monographies* (unnumbered), Paris. **DLC** (G890.A4A52) —A monograph describing and illustrating the Antarctic islands (especially the French territory), and the history of their discovery and exploration. The climate of the Antarctic is discussed briefly on p. 13 and that of Terre Adélie on p. 24, Kerguelen on p. 36–7, Crozet on p. 43, St. Paul and Amsterdam on p. 44, and the importance of the Antarctic islands for meteorological stations and long range forecasting on p. 52. *Subject Headings:* **1. Climate of the Antarctic 2. Antarctic exploration 3. Antarctica.**—*M.R.*

9.4–21 551.5:91.04(99)

Antarctic operations for International Geophysical Year, 1955–1956. *American Geophysical Union, Transactions*, 37(2):255, April **1956. DWB, DLC.** Also: Gogulski, Paul, **Operation Deep Freeze.** *Michigan Technic*, Ann Arbor, Mich., 74(7):12–13, April **1956.** fig., 5 refs. **DLC**—The first of these two articles contains a summary of Operation Deep Freeze I (1955–1956) in Antarctica (Little America V on Kainan Bay, 40 mi W along edge of Ross Ice Shelf from former Little America). The second article, by Gogulski, has a map of Antarctica which shows the voyage of the "Atka" and proposed British route across the continent. It also describes these and other Antarctic efforts of IGY. *Subject Headings:* **1. IGY Antarctic stations 2. Operation Deep Freeze I 3. Antarctica.**—*M.R.*

9.4–22 551.5:92

Tison, L. J. (*Pres. of Comité National Belge de Géodésie et de Géophysique*), **Antoine Dobrowolski et l'expédition de la "Belgica."** [Antoine Dobrowolski and the expedition of the "Belgica."] *Acta Geophysica Polonica*, Warsaw, 3(3):101–102, **1955.** Polish summary p. 102. **DLC**—On the occasion of the death of the well-known Polish meteorologist and climatologist, Antoine Dobrowolski, the author tells of his work during the expedition of the "Belgica" in

the Antarctic. The "Belgica" was the first ship to winter in the Antarctic. Another Polish scientist who was a member of the expedition was HENRYK ARCTOWSKI. He and DOBROWOLSKI were both studying at that time at the Univ. of Liége. *Subject Headings:* **1. Obituaries 2. Dobrowolski, A. B. 3. Anarctic expeditions.**—*A.M.P.*

IGY, WMO

See also: **Operation Deepfreeze I**, 9.4–21; **IGY bibliog.** (Miller, *comp.*), 9.4–31; **WMO maritime met. sessions**, 9.4–36; **IGY satellite program**, 9.4–43; **IGY satellite program** (Furth), 9.4–44; **IGY satellite program** (Newell), 9.4–45; **IGY aurora program** (Lange-Hesse), 9.4–276.

9.4–23 550.3:061.3(99)

Sans Huelin, Guillermo, **La investigación Antarctica en conexion con el Año Geofísico Internacional.** [Antarctic investigation in connection with the International Geophysical Year.] *Revista de Geofísica*, Madrid, 15(59):369–372, July/Sept. **1956. DWB**—A brief article on the Antarctic IGY program with special emphasis on the U. S. and other countries investigations in glaciology and meteorology (radiosonde stations). *Subject Headings:* **1. IGY Antarctic program 2. IGY glaciological program.**—*M.R.*

9.4–24 550.3:061.3

Hyde, Margaret O., **Exploring earth and space: the story of the I.G.Y.** Illus. by Clifford N. Geary. N. Y., Whittlesey House, **1957.** 160 p. **DLC** (QC801.3.H9)—A readable and accurate account of the IGY and its various phases including chapters on earthquakes, volcanoes, the Antarctic, oceanographic research, weather control; atomic, cosmic and solar energy or applications; rockets, satellites and radioastronomy; the airglow, aurora, balloons (manned and with animals or pilot radio and instruments). Geomagnetism, gravity, climatic changes, the ionosphere, glaciers, tidal waves, etc. are treated incidentally. *Subject Headings:* **1. History of IGY 2. Satellites 3. Popular science books.**—*M.R.*

9.4–25 551.501:061.3(02)

World Meteorological Organization, 2d Congress, Geneva, 1955 April 14–May 13, **Final Report, Vol. 2, Technical regulations.** *World Meteorological Organization, WMO*, No. 48. RC. 10, **1956.** 151 p. numerous forms (fold.) at end. **DWB** (M06.W927cg, 1955, 2nd, v.2)—The technical regulations cover all "standard practices and procedures" (*shall* be done) and recommended practices (*should* be done) promulgated by the various technical commissions and ratified by the Congress of WMO. They cover in concise and systematic fashion: 1) definitions, 2) meteorological observation stations of all types, 3) surface meteorological observations, 4) upper air observations, 5) meteorological codes, 6) telecommunications, 7) synoptic and forecasting practices, 8) climatological practices, 9) bibliographies and publications (including UDC for 551.5), 10) meteorological service for shipping, 11) for agriculture, and 12) for aviation. The last section is by far the most elaborate and complete; the sections on climatology and bibliographies the least comprehensive. (For final report of 1st congress, *see* 4.3–13, March 1953 and 8.3–35, March 1957, *MAB.*) *Subject Headings:* **1. WMO technical regulations 2. WMO conferences 3. Manuals.**—*M.R.*

9.4–26 551.5:061.3(058)

World Meteorological Organization, **Annual Report, 1956.** Its *WMO Publication*, No. 57.RP 22, **1957.** 139 p. **DWB** (M06 W927p)—The complete report on activities of the WMO during 1956, including development of general programme, relations with U.N., and Cooperative projects and specialized agencies; action taken on recommendations of U.N. and specialized agencies; information and technical assistance programs, technical activities of secretariat and of WMO, regional, administrative, publications, staff and financial affairs, and a list of working groups, permanent representatives, member countries, contributions from members, etc., etc. (For abstract on 1955 Report, *see* 8.4–39, April 1957, *MAB.*) *Subject Heading:* **1. WMO annual reports.**—*M.R.*

SERVICES

See also: **Agromet. services, Canada** (McLeod), 9.4–51.

9.4–27 551.579:551.509:63

Popov, B. M., **Rabota Iaroslavskogo Gidrometeorologicheskogo Biuro.** [The work of the Iaroslav Hydrometeorological Bureau.] *Meteorologiia i Gidrologiia*, Leningrad, No. 1:50–52, Jan. **1956. DWB, DLC**—Examples are cited of the services rendered by the Iaroslav Hydrometeorological stations to agriculture, forestry, etc. These included forecasting the date of harvesting of maize in 1954 after late planting, the forecasting of snow melting, nocturnal cooling, forest fire conditions, etc. *Subject Headings:* **1. Hydrometeorological stations 2. Agrometeorological forecasting 3. U.S S R.**—*I.L.D.*

9.4–28 551.579:06

Popov, A. V., **Peredovoe gidrometeorologicheskoe biuro.** [A progressive hydrometeorological office.] *Meteorologiia i Gidrologiia*, No. 7:62, July **1956. DWB, DLC**—The second order hydrometeorological stations at Voronezh is singled out as an especially progressive station. The workers at this station were efficient and interested in new methods of forecasting etc.; during 1955 studies on the movement of Caspian cyclones and the winter floods of the Upper Don River were made. *Subject Headings:* **1. Hydrometeorological stations 2. Voronezh, U.S.S.R.**—*I.L.D.*

CONFERENCES

See also: **Conf. on the Physics of Cloud and Precip. Particles,** 9.4–3; **WMO conferences,** 9.4–45; **WMO maritime met. sessions,** 9.4–36; **Congress on Astronomics** (Shepherd), 9.4–38.

9.4–29 551.5:061.3

Pacific Science Congress, 8th, Quezon City, Philippines Nov. 16–28, 1953, **Proceedings of the 8th Pacific Science Congress of the Pacific Science Association . . . held under the auspices of the National Research Council of the Philippines and the Republic of the Philippines. Vol. IIA, Geology and Geophysics, Meteorology.** Pub. Quezon City, 1956. p. 577–1173. figs., tables, refs., bibliogs. **DWB**—For contents of the section on Meteorology, *see* Pt. 3, p. 1433, Oct. 1957, *MAB*. *Subject Headings:* **1. Pacific Science Congress, 1953 2. Meteorology symposia.**

EDUCATION, HISTORY AND BIOGRAPHY

BIOGRAPHY

See also: **Dobrowolski and the "Belgica"** (Tison), 9.4–22.

9.4–30 551.5:92

Shvede, E. E., **Iuliĭ Mikhaĭlovich Shokal'skiĭ i Geograficheskoe Obshchestvo SSSR, k 100 letiiu so dnia rozhdeniia.** [Iuliĭ Mikhaĭlovich Shokal'skiĭ and the Geographical Society of U.S.S.R., on the occasion of the 100th anniversary of his birth.] *Vsesoiuznoe Geograficheskoe Obshchestvo, Leningrad, Izvestiia*, 89(2):93–100, March/April **1957.** Also his: **K stoletiiu so dnia rozhdeniia Iuliia Mikhaĭlovicha Shokal'skogo, 1856–1940.** *Ibid.*, 88(6):567–568 Nov./Dec. **1956. DLC**—Ever since SHOKAL'SKIĬ joined the Geographical Society in 1882, he was one of the outstanding members and finally became president of the Society in 1917. His organizational talent contributed much to the development of geophysics, oceanography and meteorology in Russia. *Subject Headings:* **1. Biography 2. Geographical societies 3. Progress in meteorology 4. Shokal'skiĭ, IU. M.**—*A.A.*

BIBLIOGRAPHY

See also: **Forest influences** (U. S. Forest Service), 9.4–54.

9.4–31 550.3:061.3:016

†Miller, Lewis E., (*comp.*), **Bibliography of the International Geophysical Year, 1957/1958: papers in the scientific literature.** Technical memorandum to the Director. Bedford, Mass., Applications and Logistics Branch, Geophysical Research Directorate, A.F. Cambridge Research Center, Air Research and Development Command, Feb. 14, 1957. 10 p. Mimeo.—An unannotated compilation of about 125 articles on the IGY or on various phases of the IGY program published during 1951 to 1956, arranged by years and alphabetically by author within each year. *Subject Heading:* **1. IGY bibliographies.**—*M.R.*

9.4–32 551.577.52:016

†U. S. Dept. of Agriculture. Library, Madison, Wisconsin, Branch, **Selected list of references on rainfall interception.** May 27, 1955. 3 p. Mimeo.—A list of 26 unannotated references on rainfall interception by forests, gleaned from the Agricultural Index (1940–date), Forestry Abstracts (1942–date), the Bibliography of Agriculture (1948–date), and the U.S.D.A. Library Branch at Madison, Wis. *Subject Headings:* **1. Precipitation interception by forests 2. Bibliography precipitation interception.**—*M.R.*

9.4–33 551.5:63:016

†Davis, Elizabeth Gould (*comp.*), **Selected bibliography on weather-crop relations in the Great Plains.** U. S. Dept. of Agriculture, May 1956. 15 p. **DWB** (M:63 U582s)—About 300 unannotated references to literature on weather-crop relationships, drought effects, etc. for the Great Plains area are compiled under the following major headings: 1) General, 2) Economic aspects, 3) Crops (general, barley, beets, corn, cotton, oats, sorghum, wheat), 4) Range forage and livestock and 5) Research methodology. The sources include **MAB** for 1950–56 and 5 other agricultural or biological abstracting services for 1946–56, plus the card catalog of the U. S. W. B. and U. S. Dept. of Agriculture Library. *Subject Headings:* **1. Bibliography on weather-crop relationships 2. Weather-crop relationships.**—*M.R.*

9.4–34 551.582(567):016

†U. S. Weather Bureau, **Bibliography on the climate of Iraq.** (1956.) 13 p. 50 refs. Mimeo. **DWB.** Also its: **Secondary bibliography on the climate of Iraq.** (1956.) 8 p. 40 refs. Mimeo. **DWB**—Ninety annotated references to literature (through 1955) on the climate of Iraq, with systematic and alphabetized subject heading indexes. *Subject Headings:* **1. Bibliography on climate of Iraq 2. Climate of Iraq 3. Iraq.**—*M.R.*

PRACTICAL AND APPLIED METEOROLOGY

MARINE METEOROLOGY AND OCEANOGRAPHY

See also: **Marine met. observations** (Reichelderfer), 9.4–78; **Hurricane generated sea waves** (Rosenblatt), 9.4–134; **Climatic changes and deep-sea sediments** (Ericson et al.), 9.4–239; special bibliography on **Waves, Currents and Tides,** p. 472.

9.4–35 551.46:91.04

*California. Univ. Scripps Institute of Oceanography, La Jolla, **Data collected by Scripps Institution vessels on Eastropic Expedition, Sept./Dec. 1955.** Sponsored by Office of Naval Research. SIO Reference 56-28, Oct. 15, 1956. 156 p. map, 7 refs. mostly tables. **DWB** (551.46 C153d)—Data for 189 ocean stations (Oct. 2–Dec. 15, 1955) are tabulated and arranged in several ways (surface currents, temp. and salinity, chlorophyll and plankton data) for the Eastropic Expedition conducted by Scripps, the U. S. Hydrographic Office and 3 fishery institutions, in the Pacific south of San Diego (30°N to 10°S) and from the Panama (77°W) coast to 122°W. Two ships, the "Spencer F. Baird" and the "Horizon" were used (both Scripps vessels). Work was intended to complement the work of the Shellback Expedition of 1952, and to make specialized observations of the equatorial countercurrent and equatorial undercurrent, the north edge of the Peru current and the thermal anticline off Costa Rica.

Subject Headings: **1. Oceanographic observations 2. Eastropic Expedition (Sept.–Oct. 1955) 3. Ocean current data 4. Eastern Tropical Pacific.**—*M.R.*

9.4–36 551.5(26)

World Meteorological Organization. Commission for Maritime Meteorology, **Abridged Final Report of the Second Session, Hamburg, Oct. 16–Nov. 1, 1956.** *World Meteorological Organization, WMO,* [*Publication*] No. 59.RP.23, **1957.** 107 p. **DWB** (M06 W927cm CMM, 1956)—The names of the 62 delegates, observers, etc., who attended this session, the agenda, numerous recommendations and resolutions, etc. are listed and the reports of working groups, transactions of the plenary sessions, etc., given in full. Annexes include a long report on measurement of sea surface water temperature presented by K. T. McLeod of Canada (Chairman of working group "B"), standard observations and forms for IGY ship observations, a plan for more data from specified ocean areas, etc. etc., and a list of 143 documents presented to the session. *Subject Headings:* **1. Marine meteorology 2. WMO maritime meteorology sessions.**—*M.R.*

9.4–37 551.508:551.46

Glaser, Arnold H., **Momentum, heat, and moisture flux over water.** Texas Agricultural and Mechanical College. Dept. of Oceanography, Contract N7onr-48705, Project NR 082-111, Final Report, Feb. **1955.** 5 p. **DWB**—Mainly a description of project to construct equipment and measure momentum, heat and moisture transfer over shallow water in the Gulf of Mexico area and to participate in the same type of program over prairie land in its Nebraska Great Plains Turbulence Field Program. Equipment developed included the rotating arm resolving anemometer and the thermistor, thermometer and psychrometer. *Subject Heading:* **1. Meteorological instruments.**—*M.R.*

ASTRONAUTICS—SATELLITE OBSERVATORIES

9.4–38 523.4:061.3:551.507.362

Shepherd, L. R. (*Tech. Dir., British Interplanetary Society*), **The artificial satellite.** *British Interplanetary Society, Journal,* 10(6):245–248, Nov. **1951. DLC**—In this introduction to a symposium on satellite vehicles held at the Second International Congress on Astronomics at London in 1951, a theoretical project of establishing a system of satellite vehicles is outlined in general terms. The system would consist of space stations rotating around the most important planets and satellites and being supplied from their planetary bases. Normal rockets would operate between the planetary surfaces and the space stations while ion rockets would serve as facilities in the interspace station traffic. *Subject Headings:* **1. Satellite observatories 2. Conferences 3. London, Eng.**—*G.T.*

9.4–39 551.507.362:629.19

Satellite and its vehicle. *Science,* Wash., D. C., 124 (3223):619–620, Oct. 5, **1956. DLC**—Earth satellite for IGY and its launching equipment (recently tested by Glenn L. Martin Co. of Baltimore at Cocoa Beach, Fla.) is described. *Subject Heading:* **1. Satellite launching.**—*M.R.*

9.4–40 523.4:629.19

Horsford, C. E. S., **The law of space.** *British Interplanetary Society, London, Journal,* 14(3):144–150, May/June **1955.** 8 refs. **DLC**—Although incentive for space flight developments would come from sovereign nations who would want to protect rights of discovery or occupation (if possible), the enormous difficulties involved would make an international central (U.N.) agency imperative for two reasons: 1) for resolving differences between countries making claims and 2) for possible observation and resulting police action against states violating agreements. The "Law of the Sea" is considered more applicable to space flight than present international air navigation laws. *Subject Headings:* **1. Space law 2. Astronautics.**—*M.R.*

9.4–41 523.4:629.19

Creciente interês en los viajes interplanetarios. [Growing interest in interplanetary trips.] *Aeronautica,* Buenos Aires, 15(157):41, April **1955. DWB**—Review of works pub-

lished in *Acta Astronautica*, etc. *Subject Headings:* **1. Astronautics 2. Interplanetary flights 3. Reviews.**—*M.R.*

9.4–42 551.507.362:523.4:629

Stimson, Thomas E., Jr., **Shall we move to another planet?** *Popular Mechanics Magazine*, Chicago, 98(2):65–69, 224, 226, 228, Aug. **1952.** illus. **DLC**—Problems connected with space flight are summed up in a popular manner. Quoting authorities like FRITZ ZWICKY, ANTHONY J. NERAD, HEINZ HABER, FRED L. WHIPPLE and other scientists, the author discusses possibilities of modifying size and position of planets by atomic fusion, the effect of loss of weight on functions of the human body, artificial satellites as intermediate space stations, etc. Photographs of rocket and telescope equipment, a portrait of FRITZ ZWICKY, and diagrams showing imaginary space station and schematic rocket escape trajectory, are presented. *Subject Headings:* **1. Interplanetary flights 2. Rockets.**—*G.T.*

9.4–43 551.507.362:629.19

Moonwatch program. *Science*, Wash., D. C., 124(3223):620, Oct. 5, **1956. DLC**—Volunteer observing program for following IGY satellites is described and equipment needed mentioned. At present there are 35 stations in program. *Subject Heading:* **1. IGY satellite program.**—*M.R.*

9.4–44 551.507.362:620.19

Furth, F. R., **Project Vanguard: the International Geophysical Year earth satellite.** *Aeronautical Engineering Review*, New York, 15(3):55–59, March **1956.** 3 figs. **DLC.** Also issued as: *Institute of the Aeronautical Sciences, Preprint*, No. 609, **1956. DWB**—A long review of the engineering and logistical problems of constructing the earth satellite in time to be launched during the IGY—1957/8. The part played by the Naval Research Lab. and the Office of Naval Research is emphasized, and the special facilities these organizations have for scientific-technological development stressed. Project Vanguard is a 3 year project. The specifications are set forth at the start as no time is available for step-by-step development. The 1st and 2nd stage rockets will be finless, the stabilizing being accomplished by mounting the motor on gimbals. A speed of 18,000 mph will be required at 300 mi height during 3rd stage. *Subject Headings:* **1. Project Vanguard 2. IGY satellite program.**—*M.R.*

9.4–45 551.507.362:629.19

Newell, Homer E., Jr. (*Naval Res. Lab., Wash., D. C.*), **International Geophysical Year earth satellite program.** *Franklin Institute, Phil., Journal of the Franklin Institute Monographs*, No. 2:2–13, June **1956. DWB**—Details of Project Vanguard, including instrumentation of vehicle by Navy Research Lab., and the 11 ton launching vehicle being constructed by Glenn L. Martin Co.; orbit, 3 stage performance, optical and radio observing program, computational centers and geophysical or astrophysical problems which may be solved by the earth satellite program are discussed in this article. *Subject Headings:* **1. Project Vanguard 2. IGY satellite program.**—*M.R.*

9.4–46 551.508:551.507.362:629.19

Ziegler, H. K. (*Signal Corps Eng. Labs., Ft. Monmouth, N. J.*), **Components for instrumentation of satellites.** (In: Van Allen, James A. (*ed.*), **Scientific uses of earth satellites.** Ann Arbor, Univ. of Michigan Press, **1956.** p. 55–67. 3 figs., 6 tables.) **DWB, DLC**—The environmental conditions of satellite instrumentations are reviewed. Present and predictable availability of suitable chemical batteries, solar batteries, electron tubes, transistors, and frequency-control devices is discussed. Special attention is given to the comparison of power sources. *Subject Heading:* **1. Satellite instrumentation.**—*Author's abstract.*

9.4–47 551.507.362.1

Leitmann, G., **A calculus of variations solution of Goddard's problem.** *Astronautica Acta*, Vienna, 2(2):55–62, **1956.** 2 figs., 4 refs., 25+24 eqs. English, German and French summaries p. 55. **DWB**—The problem of optimum thrust programming is investigated for a rocket to achieve a given altitude with given velocity and pay load and with a minimum

fuel expenditure. The rocket model is that considered by R. H. Goddard in his paper **A method of reaching extreme altitudes** (1919). A solution is given by means of the calculus of variations. *Subject Heading:* **1. Rocket research.**—*Author's abstract.*

9.4–48 551.507.362:629.19

Preliminary contract for production of a satellite. *Science*, Wash., D. C., 122(3175):867–868, Nov. 4, **1955. DLC**—Preliminary contract awarded by U. S. Dept. of Defense to Glenn L. Martin Co. of Baltimore and to the General Electric Co. for a first stage rocket motor. The Martin Co. will produce the rocket launching vehicle, the Navy Dept. will award and monitor the contracts under Project Vanguard. F. R. Furth, the Chief of O.N.R., will coordinate and supervise the project. About 10 satellites will be launched on different orbits to rotate at 200 to 800 mi from the earth. *Subject Headings:* **1. Satellite launching vehicles 2. Project Vanguard.**—*M.R.*

GLACIER ICE AND SEA ICE

See: **Radiation balance on glaciers, Alps** (Dirmhirn), 9.4–140; **Radiation measurements, Greenland Ice Cap** (Diamond, Gerdel), 9.4–141; **Ice age theories** (Bariss), 9.4–238.

AERONAUTICAL METEOROLOGY

See: **Air freight** (Bouverot), 9.4–56; **Fog, London Airport** (Evans), 9.4–181.

AGRICULTURAL METEOROLOGY

See also: **Land and its uses** (Higbee), 9.4–6; **Agromet. forecasting** (Popov), 9.4–27; **Weather-crop relationships** (Davis, *comp.*), 9.4–33; **Freezing effects on trees, Washington and Idaho** (Daubenmire), 9.4–153; **Irrigation effects on humidity, Arizona** (Ohman), 9.4–173; **Potential evapotranspiration and irrigation** (Robertson), 9.4–177.

9.4–49 551.585

Bocz, Ernö, **Eghajlati tényezök komplex ábrázolása a növénytermesztésben.** [Combined presentation of climatic elements for plant growing.] *Időjárás*, Budapest, 60(5):292–299, Sept./Oct. **1956.** 6 figs., 2 tables, 3 refs., eqs. Russian summary p. 292. **DLC**—The following climatic index is proposed for regional classification: $x.y/a(1+b/100)$, where x=temperature in °C; y=sunshine duration in hours; a=precipitation in mm; and b=relative humidity in %. With the help of this index, combined climatic values are computed for various places in Hungary from data of 1952 and 1953. The values thus obtained are compared with various other factors, such as propagation of insects, the single meteorological elements, and potato crops. According to an editor's note, the data presented may serve as encouragement for further research but do not establish the usefulness of the proposed climatic formula (due to the shortness of the period from which data were taken). *Subject Headings:* **1. Climatic indexes 2. Potatoes 3. Hungary.**—*G.T.*

9.4–50 551.586:63

*Guyot, Edmond (*Neuchâtel Univ., Switzerland*), **La climatologie et les cultures.** [Crop climatology.] *Thessalonike. Panepistēmion. Ergastērion Meteōrologias, Meteōrologika*, No. **5, 1956.** 21 p. 3 figs., tables, 8 refs., eqs. **DWB**—Three methods of investigating the effect of climatic factors upon quantity and quality of crops are discussed, namely: a) the method of correlations as developed by Montessus de Ballore (1932), b) comparison of climatic elements at two places with good and bad crops, respectively, and c) comparison of weather elements during several good and bad harvest years. Examples are given of the application of each method; for a) correlation coefficients worked out by A. Golden (1937–1939) for weather elements and quantity or quality of wine at Luxemburg; for b) comparison of climatic factors and of wine (1929–1930) at Schatzalp (Switzerland) and Korneuburg (Austria); and for c) comparison of climatic elements during 10 best and 10 worst vintage years in Neuchâtel Canton (1871–1932). Methods of studying weather effects on forest growth are also discussed. *Subject Headings:* **1. Agricultural climatology 2. Climatic comparisons 3. Central Europe.**—*G.T.*

9.4–51 551.5:63:061.1(71)

McLeod, K. T. (*Met. Serv., Canada*), **Weather services for agriculture.** *Canadian Society of Agronomy, 2nd Annual Meeting, Univ. of Toronto, June 25–28, 1956, Proceedings, Sec. C,* p. 8–12. table. **DA?**—A general review of the services provided by the Canadian Meteorological Service to agriculture—fruit growers, farmers, etc. The general forecasts, special forecasts, fruit frost forecasts, extended and long range forecasts (not now provided), processed climatic data, special advisory or consulting services and future research and service expansion are among the aspects of the problem covered in this lecture. The Canadian Met. Service is said to be the third largest in the world. At present, forecasts are not interpreted in operational terms. *Subject Headings:* **1. Agricultural meteorology 2. Canadian agrometeorological service 3. Canada.**—*M.R.*

9.4–52 551.586:632.111.3:631.67

*Rudnev, V. M., **Agrometeorologicheskaia kharakteristika uslovii rosta i razvitiia ozimykh kul'tur v osenniĭ period na territorii orosheniia Kuĭbyshevskogo gidrouzla.** [Agrometeorological characteristics of the conditions for the growth and development of winter crops during the autumn season in the irrigated areas around the Kuibyshev hydroelectric plant.] *Moscow. Tsentral'nyĭ Institut Prognozov, Trudy,* 29(56):70–76, **1953.** 15 tables, 2 refs. **DLC**—The study of the agrometeorological conditions during the period of fall growth of winter crops is based upon fifteen years of observations made at 14 points in the Kuibyshev territory. The data presented include calculated and actual mean dates of sowing, mean precipitation for ten days preceding beginning of sowing, mean productivity of soil moisture, frequency of year with different soil moisture reserves, etc. It was found that in this region the heat necessary for growth is adequate during the autumn if sowing is carried out during the normal sowing period. The precipitation and soil moisture conditions associated with proper growth on the right and left bank regions of the Volga are discussed. *Subject Headings:* **1. Wintering of crops 2. Agricultural meteorology 3. Grain cultivation 4. Kuibyshev, U.S.S.R.**—*I.L.D.*

9.4–53 551.58:63

Gembel', A. V., **Mestnyĭ klimat i ego vliianie na sel'skoe khozaĭstvo.** [Local climate and its influence on agriculture.] *Vsesoiuznoe Geograficheskoe Obshchestvo, Leningrad, Izvestiia,* 88(6):551–555, Nov./Dec. **1956.** 2 figs., 4 refs. **DLC**—In connection with the utilization of the non-black soil regions of the northwestern areas of European U.S.S.R., the author discusses the importance of microclimatic analysis and describes the microclimate of the depression along the middle course of the Msta River which adjoins the spur of the Valdai Mts. The more favorable climatic conditions (air temperature regime, snowfall effects, etc.) and less favorable rainfall conditions as compared with surrounding areas such as Voronezh, etc. are discussed and related to various topographic conditions. *Subject Headings:* **1. Agricultural climatology 2. Microclimatic analysis 3. Northwestern U.S.S.R.**—*I.L.D.*

FOREST METEOROLOGY

See also: **Rainfall interception by forests** (U. S. Dept. of Agric.), 9.4–32; **Alpine climatology** (Garavel), 9.4–245.

9.4–54 551.588.6:016

†U. S. Forest Service, **Forest and range influences publications, 1905–1955.** May **1956.** 77 p. Mimeo. 900 publications listed alphabetically by author. **DWB**—A large number of these unannotated references concern forest influences on rainfall interception, snow and snow melt, soil moisture, infiltration, runoff, erosion, etc. However, there is no detailed subject index. *Subject Headings:* **1. Bibliography on forest influences 2. Forest influences.** —*M.R.*

9.4–55 551.588.6:551.524.2:551.577.2

Baumgartner, Albert (*Met. Inst., Munich*), **Temperatur und Niederschlagsverteilung im Bergwald.** [Temperature and precipitation distribution in a mountain forest.] *La Météorologie,* Paris, Ser. 4, No. 45/46:251–256, Jan./June **1957.** 8 figs. (incl. photo), 4 refs. German,

French and English summaries p. 251. **DWB**—Under the direction of R. GEIGER, the Munich Meteorological Institute has, since 1953–1955, carried on research on forest meteorology in the Gr. Falkenstein, Bavarian Forest. The author comments on some results of rain and fog precipitation measurements at different levels between 600 and 1300 m altitude, and on the results of distant electrical measurements of the air temperature taken by means of thermistors in the forest area extending up to 30 m above ground, at 6 levels situated along a 3 km profile between the valley and the top of the mountain. *Subject Headings:* **1. Forest meteorology 2. Temperature distribution 3. Precipitation distribution 4. Bavarian Forest.**—*Author's abstract.*

INDUSTRIAL METEOROLOGY

See also: **Weather effects on industry** (Russell et al.), 9.4–2.

9.4–56 551.5:656.7:577

Bouverot, —, **Problèmes biologiques posés par le transport du frêt vivant.** [Biological problems attending transportation of living freight.] *La Météorologie*, Paris, 4th Ser., No. 30:136–143, April/June **1953.** French, English and Italian summaries p. 136. **MH-BH**—Among the perishables, etc. which are hauled by air are listed race horses, sheep, fancy cats and dogs, tigers, exotic flowers, monkeys, birds, oysters, eggs, caviar, fancy fruit, meat, medicine, serum, and sperm for artificial insemination. Meteorological factors affecting these organisms are decreased pressure, lack of O_2, metabolism changes, cold, dryness, ionization, acceleration, noise, vibration and toxic odors, disease, pests, etc. Methods of compensation or counteracting these effects are outlined. *Subject Headings:* **1. Air transport of perishables 2. Air transport of livestock 3. Aviation biometeorology.**—*M.R.*

9.4–57 551.581:69(213)

Drysdale, J. W. (*Ass't. Director, Commonwealth Experimental Building Station, Australia*), **Building construction in hot climates: some climatic consideration.** (In: Building Research Congress, Garston, 1951, **Papers presented in Division 3.** pub. **1951.** p. 99–103. 5 refs.) **DWB** (624 B932p)—The author discusses the meteorological characteristics of hot dry and hot humid climates, the meteorological data which the building designer needs in order to build properly in the tropics and functional requirements for offsetting unfavorable thermal conditions including specific means with reference to each meteorological variable. Also, traditional building practices are considered and more scientific practices for hot dry and hot humid climates are outlined. *Subject Headings:* **1. Building construction 2. Tropical climates.**—*I.L.D.*

9.4–58 551.586:628.8

Grocott, J. F. L. (*Anglo Iranian Oil Co. Ltd., London*), **Air conditioning in the tropics.** (In: Building Research Congress, Garston, 1951, **Papers presented in Division 3.** pub. **1951.** p. 112–117. 7 figs., table, 4 refs.) **DWB** (624 B932p)—The author discusses the relationship between climate and comfort with special reference to the data on these problems obtained by A.S.H.V.E. with the use of the effective temperature scale, the influence of building construction on air cooling requirements and apparatus for providing air cooling. *Subject Headings:* **1. Air conditioning 2. Comfort climate 3. Building construction.**—*I.L.D.*

9.4–59 551.58:62

Böer, W. (*Potsdam*), **Über Stand und Aufgaben einer technischen Meteorologie und Klimatologie.** [Status and function of technological meteorology and climatology.] *Die Technik*, Berlin, 11(2):109–111, Feb. **1956.** 9 refs. **DLC**—General considerations of applied meteorology or climatology (definition of scope, etc.) are followed by specific examples and techniques for solving industrial problems through knowledge of macro- or micro-meteorology. Corrosion in the tropics, textile industry problems connected with humidity, air conditioning for increasing working efficiency in industry are among problems considered. Knowledge of meteorology and of the effect of the elements on the product are considered essential. *Subject Headings:* **1. Applied meteorology 2. Technoclimatology 3. Industrial meteorology.**—*M.R.*

9.4–60 629.123.5

McDonald, W. F. (*Consultant, U. S. W. B., Wash., D. C.*), **Notes on the problems of cargo ventilation.** Wash., D. C., Weather Bureau, Feb. 16, **1956.** 37 p. tables. **DWB** (698.92 U587n). Also pub. as: *World Meteorological Organization, WMO* (*Publication*), No. 63. TP.23, Technical Note, No. 17, **1957.** 38 p. figs., tables, **DWB** (MO6 W927p).—Preliminary notes on the practical aspects of cargo ventilation, where air conditioning is not employed. Air may flow into cargo areas, where spoilable materials are stored, if the dew point is much lower than the dry bulb temp., and is not equal to or higher than the cargo temp., and will keep the cargo dry. The air at the exhaust should show a higher dew point than at the intake, if actual moisture reduction is effective. An empirical rule states that when the ship goes from a warmer to a cooler area, the cargo should be ventilated. However, this may lead to cargo spoilage in case cargo is cooler than the dew point outside. The reverse would hold—i.e., on moving to warmer air masses, ventilation should be shut off to prevent spoilage. Accurate measurements are absolutely necessary. Instruments and methods of measurement and calculation are outlined. Experiments by the Deutscher Wetterdienst Seewetteramt, Hamburg are reported in the appendix. *Subject Heading:* **1. Cargo ventilation.**—*M.R.*

9.4–61 551.584.6:629.123.4

Niemann, —, **Die technischen Einrichtungen zur Überwachung und Beeinflussung des Laderaumklimas.** [Installations for control and conditioning of ships' hold climate.] *Hamburg. Seewetteramt, Einzelveröffentlichungen*, No. 9:41, **1956. DWB**—Brief description of "Cargocaire installations" which provide effective ventilation of ships' holds, dehumidification, and continuous recording of temperature and dew point outside and inside. *Subject Headings:* **1. Ships' hold climates 2. Cargo ventilation.**—*G.T.*

9.4–62 551.586:628.8

Ghai, M. L. (*Dir. of Res. and Dev., Bush Manufacturing Co., Hartford, Conn.*) and Sundaram, R. (*Natl. Physical Lab., New Delhi, India*), **Selection of outside design temperature for heat load estimation.** *American Society of Heating and Air-Conditioning Engineers, Transactions*, 61:169–188, pub. **1956.** 7 figs., eqs. **DWB** (P A512sw)—Data on heat flow through building walls with varying outdoor temp. are presented graphically. Heavy walls present a different problem from thin walls, owing to greater lag in response to outside temp. Mathematical equations are applied to cooling as well as heating when varying weather and wall storage capacity complicates relations. Solar radiation loads are not considered. Applications are therefore restricted. *Subject Headings:* **1. Heat flow through walls. 2. Outside design temperature.**—*M.R.*

MEDICAL METEOROLOGY

9.4–63 551.556:616.1(23)

Kamiyama, K.; Kashiwagi, T.; Yano, N. et al., **On effects of environment condition on vasomotor reflex: the effects of mountain residence on vasomotor reflex and 17-Ketosteroid.** *Papers in Meteorology and Geophysics*, Tokyo, 7(4):435–440, Jan. **1957.** 7 figs., 2 tables, 3 refs. **DWB**—The variation of the type of peripheral vasomotor reflex was observed by plethysmograph after deep-breathing and exposure to the wind at Mt. Norikura. The plethysmograms obtained were divided into four types, and those were daily observed, taking up the variation by the combination of those types as a mark of stereotype. The values of variation were remarkably large in the early period of mountain residence at Mt. Norikura, 2720 m above sea level. Blood pressure was higher on the mountain than on the level ground, and the difference between the maximum and the minimum blood pressure was considerably large in the early period of residence. When the variation of excreted volume of 17-Ketosteroid was large, that of stereotype was large, and when the former was small, the latter was small too. In other words, the large excreted volume of 17-Ketosteroid showed the large variation of stereotype. Blood pressure was more influenced by meteorological conditions on the mountain than on the level ground. *Subject Headings:* **1. Wind effects on vasomotor reflexes 2. High altitude effects on vasomotor reflexes 3. Mt. Norikura, Japan.**—*Authors' abstract.*

METEOROLOGICAL OBSERVATIONS AND INSTRUMENTS

METHODS OF OBSERVATION

See also: **WMO technical regulations,** 9.4–25; **Upper air observation** (Newell), 9.4–81; **Radiation over snow** (Band), 9.4–90; **Precip. measurement** (Furlan), 9.4–92; **Precip. measurement** (Grunow), 9.4–93; **Precip. measurement** (Pašić), 9.4–96; **Radar cloud observations** (Feteris), 9.4–184.

9.4–64 551.501:551.579.5

Maricic, M., **Problem merenja vlažnosti tla u FNRJ.** [Problem of soil moisture measurement in Yugoslavia.] *Yugoslavia. Hidrometeorološka Služba, Vesnik,* 5(3/4):99–103, July/Dec. **1956.** fig. **DWB**—The desirability of extensive soil moisture measurement and the costliness of the conventional drying-chamber method make it necessary to look for another method of soil moisture measurement which would be simple, inexpensive and yet sufficiently accurate. The author proposes such a method. Soil moisture deficit is measured by weighing a soil sample first with the natural moisture and then again after it has been saturated with water. From the amount of deficit the moisture can be readily determined if the soil's retention capacity (a practically constant value) is known. *Subject Heading:* **1. Soil moisture measurement.**—*G.T.*

9.4–65 551.501:551.579.5

Pletser, János, **A szárítószekrényes talajnedvességmérés új, gyors módszere.** [New quick method of soil moisture measurement by means of a drying chamber.] *Időjárás,* Budapest, 61(1):46–50, Jan./Feb. **1957.** fig., 4 tables. French summary p. 46. **DLC**—At the Agrometeorological Station at Martonvásár a project involving a large number of soil temperature and soil moisture measurements was initiated in 1955. It took 20 to 21 hours daily to measure 300 samples a week by the ordinary weighing and drying operations. By means of several simplifications described in this paper it became possible (in 1956) to increase the number of weekly samplings to 500–600, at the same time cutting man hours in half. The accuracy of the simplified method is discussed. *Subject Headings:* **1. Soil moisture measurement 2. Martonvásár, Hungary.**—*G.T.*

9.4–66 551.501:551.577:551.433

Schirmer, Hans, **Umstrittene Niederschlagsmessungen im Hochgebirge.** [Controversial precipitation measurements in high mountains.] *Germany. Deutscher Wetterdienst in der US-Zone, Mitteilungen,* No. 11, Aug. **1951.** 14 p. 5 figs., 2 tables, 30 refs. **DWB**—Maximum precipitation zones at certain altitudes in high mountains, discussed for many years, appear as the result of misleading measurement techniques. Rain gages with openings parallel to the slope give more reliable results. Literature information is analyzed and compared with hydrological results. A new definition of precipitation amounts is proposed. *Subject Headings:* **1. Precipitation measurement 2. Mountain climatology 3. Hydrologic balance.**—*A.A.*

9.4–67 551.501.4:551.577.36

Schumann, T. E. W., **The frequency or spectral distribution of daily and annual rainfall amounts.** *South Africa. Weather Bureau, Notos,* 5(3):166–170, **1956.** 3 figs., 4 tables, 21 eqs. **DLC**—Since rainfall is not randomly distributed in time, but occurs in showers, for statistical purposes we may regard rain as attracting rain. In analogy with this observational fact a game of chance has been devised consisting essentially of a board with a very large number of squares at which pellets are discharged. The probability of any particular square being hit, is enhanced proportionately to the number of times it has already been hit, i.e., to the number of pellets it already contains, thus simulating the attraction of rain for rain. By computing the number of squares containing any specified number of pellets one in effect obtains a frequency distribution, which is found to depend upon two parameters p and k, where p is the average number of pellets per square and k the "attractive force" between pellets. The family of frequency curves thus obtained is admirably suited to fit all types of rainfall frequency curves, from the normal curve to the extreme J-distribution of daily rainfall. Data used in the test are for the Royal Observatory, Cape Town (1842–1955). *Subject Headings:* **1. Rainfall frequency distribution 2. Methods of computation.**—*Author's abstract.*

9.4–68 551.501.7:551.513:551.582

Breistein, M. and Smebye, Sigurd J., **W-vindskomponenten over Norge i 500 mb.-flaten og dens forbindelse med klimaet og den storstilte sirkulasjon.** [The W-Wind component over Norway at the 500 mb surface and its relation to the climate and large scale circulation.] *Norske Videnskaps-Akademi i Oslo. Institutt for Vaer- og Klimaforskning, Report,* No. 7, **1952.** 9 p. 2 figs., tables, 3 refs. **DWB** (M055 N863p)—A study of the correlations between the changes in monthly mean west-wind components $\bar{W}^m$ at 500 mb over Norway (55°–70°N, and 5°W to 15°E) and various climatic parameters for Norway and vicinity gives the following results. For the correlation between $\bar{W}^m$ and ΔT^m (monthly mean meridional temp. gradient at 500 mb over Norway), $r=0.86$ for Sept. 1947–Jan. 1952; for $\bar{W}^m$ and sunspot number. $r=0.26$; for $\bar{W}^m$ and $\bar{R}^m$ (monthly mean precip. for Apr. 1946–May 1951) for

	Year	Winter
Oslo	$r=0.13$	0.00
Dombas	$r=0.11$	0.14
Trondheim	$r=0.53$	0.67
Bergen	$r=0.66$	0.84
Tromsö	$r=0.72$	0.95

For $\bar{W}^m$ and temperature anomaly $\bar{T}\bar{T}^m$ the reverse is true, the larger correlations occur in SE Norway (Oslo 0.41 for year and 0.54 for winter, Dombas 0.41 for year and 0.61 winter and the least in N Norway: Tromsö—0.06 for year and 0.24 for winter. Finally the coefficient of correlations for 5 day means of west wind component $\bar{W}^5$ and of the zonal index (55°–70°N and 120°W–80°E) was 0.68, and for 45°–60°N and 120°W to 80°E, 0.26. *Subject Headings:* **1. Zonal index—climate relationships 2. Large scale circulation 3. Norway.**—*M.R.*

9.4–69 551.501.81:551.577.37

Illinois. State Water Survey Div. Meteorologic Laboratory at Illinois Univ., **Study on intensity of surface precipitation using radar instrumentation.** Contract DA-36-039-Sc-64723, Project DA 3-99-07-022, Third Quarterly Technical Report, Jan. 1–March 31, **1956.** 28 p. 2 figs., table, eqs. **DWB** (M01.81 I29i)—Radar rainfall and raingage measurements for 13 storms in Sept. 1952–Sept. 1953 are analyzed statistically and synoptically and from the point of view of point rainfall intensity, etc., to see if some improvement might be made in estimating rainfall over an area or from a point, using radar. No remarkable results are noted. The synoptic and climatological relations are promising. (For Pts. 1 and 2, *see* 9.2–145, Feb. 1958 and 9.3–145, March 1958, *MAB.*) *Subject Headings:* **1. Radar rainfall intensity measurement 2. Goose Creek, Ill. I. Semonin, R. G. II. Schuetz, J.**—*M.R.*

9.4–70 551.501.81:551.577.37

Illinois. State Water Survey. Meteorologic Lab. at Illinois University, **Study on intensity of surface precipitation using radar instrumentation.** Contract DA-36-039 SC-64723, Project DA 3-99-07-022, Fourth Quarterly Technical Report, April 1–June 30, **1956.** 13 p. 4 figs., table, 2 foot-refs. **DWB** (M01.81 I29i)—Results of 605 hours of CPS-9 operation aimed at a study of the use of radar in areal rainfall estimation, are reported. The 100 sq mi Goose Creek network was divided into 3 sub-areas for making comparison between radar and raingage measured precipitation using this smaller area, the incidence of high-rate (1.5 to 2.5 inches/hr) rainfall was increased in comparison with that from the 100 sq mi network. Correlation of the precipitation recorded with various synoptic or aerological parameters gave disappointing results. *Subject Headings:* **1. Radar precipitation measurement 2. Goose Creek, Ill. I. Project 3-99-07-022.**—*M.R.*

9.4–71 551.501.83:551.515.3/4

Dickson, Edwin B. and McConahy, Raullo, J. (*both, Severe Weather Warning Center, K. C., Mo.*), **Sferics readings on windstorms and tornadoes.** *American Meteorological Society, Bulletin,* 37(8):410–412, Oct. **1956.** 3 figs. (incl. photos), 8 refs. **DWB**—Project Tornado-Sferics, conducted by the Severe Weather Warning Center at Tinker Air Force Base, Oklahoma from June 21, to Oct. 2, 1954, and Feb. 16 to Sept. 11, 1955, obtained considerable data from

3 bases in Kansas and Arkansas on sferics before and after thunderstorms with wind gusts of 50 kn or more, and tornadoes, respectively. The maximum frequency of sferics connected with wind squalls occurred 1 hour before the storm in 1954 and 45 min. before the squall in 1955, whereas the maximum frequency for tornadoes was 1½ hours in both cases. This characteristic difference between the time of maximum and time curves for tornadoes and for ordinary severe thunderstorms can be used in prediction although the cause is not known. *Subject Headings:* **1. Sferics from tornadoes 2. Sferics from thunderstorms 3. Kansas 4. Arkansas.**—*M.R.*

OBSERVATIONAL DATA

See also: **Pyrheliometric measurements, Indonesia** (Reesinck), 9.4–144; **World climatological extremes** (Seamon, Bartlett), 9.4–237.

9.4–72 551.506.1(497.1)(058)

*Belgrade. Meteorološka Opservatorija, **Meteorološka osmatranja u Beogradu.** [Meteorological observations at Belgrade], **1951, 1952, 1953, and 1954,** pub. Belgrade **1953, 1954, 1955, 1956.** about 150 p. each. Mostly tables. "Observations began 1920–." **DWB**—Tables of hourly, daily, monthly and annual values of the usual meteorological elements are given for Belgrade in each yearbook. In addition, soil temperature is given for depths to 3.0 m for 7, 14 and 21 h local time. Snow depths, wind frequencies, evaporation, vapor pressure, sunshine hours and synoptic hours (01, 07, 13 and 19 h) data are given. *Subject Headings:* **1. Annual meteorological data summaries 2. Observational data 3. Soil temperature data 4. Belgrade, Yugoslavia. I. Serbia. Zavod za Meteorologiju i Khidrologiju.** —*M.R.*

9.4–73 551.506.1(058)(497.1)

*Belgrade. Aerološka Opservatorija, **Godišnjak Aerološke Opservatorije u Beogradu. Annuaire de l'Observatoire Aérologique à Belgrade.** [Yearbook of the Belgrade Aerological Observatory], **1952,** pub. Belgrade **1956.** 95 p. 124 figs., numerous tables. In Croatian and French. **DWB**—Pilot balloon observation data for each 3-hourly period each day of the year are presented *in extenso* for Belgrade Observatory. In addition are presented tables showing the character of the weather, the precipitation, weather phenomena, and changes in weather phenomena at 22 stations, and charts (scores of them) showing hourly isochrones of cold wave progression across Yugoslavia with a discussion of this cold wave month by month for the year 1952. (For abstract on 1951 issue, *see* 5.6–45, June 1954, *MAB.*) *Subject Headings:* **1. Upper air data yearbooks 2. Annual meteorological reports 3. Yugoslavia.** —*M.R.*

9.4–74 551.506.1(85)

***Promedio mensual meteorológico del Peru, Sept. 1955–March 1956.** [Monthly meteorological means for Peru.] *Revista Meteorológica del Peru,* Lima, 2(3):37–43, Oct./Dec. **1956.** entirely tables. **DWB**—Data for about 40 stations in various departments of Peru are presented in monthly tables, with coordinate mean pressure, temperature, dew point, relative humidity, precipitation, rainy days and wind direction and speed. *Subject Headings:* **1. Monthly meteorological reports 2. Peru.**—*M.R.*

9.4–75 551.506.2(672)

*Richard, René, **Rapport de la Mission Scientifique Française concernant les travaux effectués à Bangui, Afrique Equatoriale Française, 1er août 1932–31 juillet 1933.** [Report of the French Scientific Mission on the work at Bangui, French Equatorial Africa, Aug. 1, 1932–July 31, 1933.] (In: France. Mission Polaire Française, 1932–1933, **Année polaire Internationale, 1932–1933, Participation Française, Vol. 3,** pub. Paris, **1941.** p. 117–137. tables, refs.) **DLC** (G587.F7)—The temperature, pressure, relative humidity, vapor pressure, rainfall, wind, thunderstorms, visibility, cloudiness, evaporation, optical phenomena, fog and dew and upper air winds at Bangui (Ubangi-Chari), French Equatorial Africa (4°21′50″N, 18°33′12″E, 403 m elev.) located 3.5 km from the bank of the Ubangi River, are analyzed and discussed in 14 separate chapters for the period Aug. 1932–July 1933 (Sec. Int. Polar

Year). The dry season is Dec.–Feb.; the wet season July–Oct. High absolute humidity (maximum recorded was 24 mm) is the greatest source of discomfort. *Subject Headings:* **1. International Polar Year, 1932–1933 2. Polar year data, 1932–1933 3. Climate of Bangui, French Equatorial Africa 4. Bangui, French Equatorial Africa. I. France. Mission Polaire Française, 1932–1933.**—*M.R.*

9.4–76 551.506.3

*Berkes, Zoltán, **Harminc évi törzsátlagok, mint éghajlat-jellemző számértékek.** [Thirty-year normals as characteristic values of a climate.] *Időjárás*, Budapest, 60(6):382–384, Nov./Dec. **1956.** 7 tables. **DLC**—At the Warsaw conference of 1935 the period 1901–1930 was recommended for world-wide establishment of normals of climatic elements. The World Meteorological Organization in 1956 adopted the period 1921–1950. In this note monthly normals of temperature, precipitation and pressure at Budapest are compared for these two periods. The two periods are found to be quite different in their climatic averages. They also differ from 100-year normals. Average normal temperatures are also listed for overlapping 30-year periods from 1811 to 1950. The author concludes that 30-year normals are poor indicators of climate. By choosing the preceding 30 years at the end of each decade (as suggested by WMO), existing climatic trends can best be kept up with, which is especially important for agriculture. *Subject Headings:* **1. Normal period (1901–1930) 2. Normal period (1921–1950) 3. Normal period comparisons.**—*G.T.*

9.4–77 551.506.7:551.557(673)

*Angola. Serviço Meteorológico, **Observações meteorológicas de altitude em Angola, 1953.** [Upper air meteorological observations in Angola, 1953.] Luanda, Imprensa Nacional, **1955.** 121 p. almost entirely tables. "Contains the results of upper air soundings formerly included in its **Elementos Meteorológicos e Climatólogicos de Angola,** a publication discontinued in 1952, and superseded by this and two other publications." (*See* 4.7–31 July, 1953, *MAB*, for discontinued pub.) **DWB**—The present section of the yearbook for Angola contains daily at 10 h and 16 h, upper air wind observations for Luanda (05, 10, and 16 h) Malange, Dundo, Lobito, Nova Lisboa, Vila Luso, Mocamedes e Vila Serpa, Pinto and radiosonde data for Luanda (07 h) for 1953 for standard levels of 100 mb. Isotherms for each 1 km surface to 16 km are presented in time cross sections by months. *Subject Headings:* **1. Upper air wind data 2. Radiosonde data 3. Angola.**—*M.R.*

9.4–78 551.506.7(26)

Reichelderfer, F. W., **Upper-air programme on transient ships.** *World Meteorological Organization, WMO Bulletin*, 6(3):109–110, July **1957.** photo. **DWB**—Using 300g balloons and light weight radiosondes, the U. S. W. B. has in 1950 and 1951 made several successful radiosonde ascents from merchant vessels operating in the North Atlantic. In 1955 a regular program was started in the Pacific, with two observers making twice daily radiosonde and 4 synoptic observations. Only 3 soundings were missed in 240 days at sea. In 1956 a similar program was started between the East Coast of the USA and Puerto Rico and later in the Gulf of Mexico. A release is shown in a photograph. *Subject Headings:* **1. Marine meteorological observations 2. Marine radiosonde observations 3. North Pacific.**—*M.R.*

INSTRUMENT CARRIERS

See also: **Satellite observatories** (Shepherd), 9.4–38; **Satellite launching,** 9.4–39; **Space flight** (Stimson), 9.4–42; **IGY satellite program,** 9.4–43; **IGY satellite program** (Furth), 9.4–44; **IGY satellite program** (Newell), 9.4–45; **Satellite instrumentation** (Ziegler), 9.4–46; **Rocket research** (Leitmann), 9.4–47; **Satellite launching vehicles,** 9.4–48.

9.4–79 551.508.53/4:551.507.321.4

†Ripken, John F. (*Minnesota Univ.*), **Instrumentation for studies of low-velocity winds.** *Hydraulics Conference, 6th, Univ. of Iowa, June 12–15, 1955, Proceedings*, p. 187–218, pub. **1956.** 20 figs. (incl. photos), 32 refs. **DWB** (532 H995pr)—Numerous types of anemometers which could be used for obtaining distance recording, accurately sensitive, and quick response

wind measurements from a non-rigid or balloon suspension support, with winds of 0 to 50 fps, are described and tests conducted to select the most suitable type, described and illustrated. The types include: (I) dynamic pressure anemometers: 1) pendulum force-measuring devices, 2) normal pressure plate anemometers, 3) the drag sphere anemometer, 4) the cortextrail anemometer, 5) sonic phasemeter anemometer, 6) rotational cup anemometers and 7) vane, windmill and propeller anemometers. (II) thermal anemometers: 1) hot wire, 2) thermistor, 3) heated thermocouple and 4) ionization anemometers. *Subject Headings:* **1. Anemometers 2. Balloon-borne anemometers.**—*M.R.*

9.4–80 551.507.362.1

Liu, Vi-Cheng (*Mich. Univ., Ann Arbor*), **On the motion of a projectile in the atmosphere.** *Zeitschrift für angewandte Mathematik und Physik*, Basel, 8(1):76–82, Jan. **1957.** 11 refs., 5+ eqs. **DWB, DLC**—The equation of rectilinear motion of a projectile which moves in an atmosphere, of which the density decreases exponentially with the altitude, is solved. It is found that the velocity of the projectile can be expressed explicitly in terms of confluent hypergeometric functions. This theory is applied to treat two specific problems: (1) the flight analysis of a sounding rocket during the free-flight period and (2) the calculation of ambient temperature from the trajectory of a spherical projectile. *Subject Heading:* **1. Rocket rectilinear motion.**—*Author's abstract.*

9.4–81 551.507.362.1:551.501.7

Newell, Homer E., Jr. (*Naval Res. Lab., Wash., D. C.*), **The high altitude sounding rocket.** *Jet Propulsion*, 27(3):261–262, 288, March **1957. DLC**—The essential feature of a sounding rocket is its ability to carry scientific instruments into the upper atmosphere. Because of this, such things as solar radiation, radio frequency waves, the ionosphere, the earth's magnetic field, the composition of the atmosphere, the aurora, cosmic rays, micrometeorites, cosmic dust, atmospheric structure and airglow can be studied from a vantage point above the atmosphere. Because of the absorbing and obscuring effect of the atmosphere many of these observations can be made only from rockets. There are needs for rockets to carry instruments to peak altitudes ranging from 20 to over 200 mi. Payload requirements vary from less than 25 to more than 200 lb depending on the complexity and nature of the experiment to be performed. Operational simplicity, attitude controllability, cleanness, moderate acceleration, recoverability, and reasonable costs are all desirable features for a high altitude sounding vehicle. Rockets currently in use for upper air explorations are: Aerobee, Deacon, Cajun, ASP, Nike-Deacon, Nike-Cajun, Rockoon, Veronique, and Monica. A number of others are under development. *Subject Headings:* **1. Rocket research 2. Rocket development 3. Upper air observation.**—*Author's abstract.*

9.4–82 551.507.362.1:551.508.25

Ross, Malcolm D. and Masterson, John E. (*both, Office of Naval Res.*), **Rockair: a promising new tool for specialized high altitude research.** *Jet Propulsion*, N. Y., 27(3):276–278, March **1957.** 5 figs., 2 tables, 6 refs. **DLC**—A standard 2.75-in. FFAR (folding fin aircraft rocket) rocket nose cone was instrumented to detect cosmic ray radiation and to telemeter this information as a qualitative measurement of flight time and altitude. The information was telemetered by a standard radiosonde transmitter. The 2.75-in. FFAR launched from a Navy F2H2 Banshee fighter reached an altitude of approximately 180,000 ft. The cost of this service production rocket prior to modification is in the neighborhood of $50. *Subject Headings:* **1. Rockair 2. Rocket instrumentation 3. Cosmic ray detection.**—*Authors' abstract.*

9.4–83 551.507.362.1

Singer, S. Fred and Lawrence, Arthur L., **Terrapin: an upper atmosphere research vehicle.** *Jet Propulsion*, N. Y., 27(3):281–284, 288, March **1957. DLC**—Terrapin is a 220-lb high altitude vehicle consisting of two solid propellant rocket motors. Its low weight and cost together with ease of handling make it a desirable tool for extensive upper air research. The characteristics of the vehicle and of the instrumentation are described in this paper. *Subject Headings:* **1. Terrapin 2. Rocket instrumentation.**—*Authors' abstract.*

9.4–84 551.507.362.1:629.135

Slavin, Robert M. (*U. S. Air Force Cambridge Res. Center*), **The Air Force Rockaire program.** *Jet Propulsion*, N. Y., 27(3):279–280, March **1957.** 5 figs. **DLC**—To carry small payloads to altitudes of interest to the upper atmosphere research scientist, the capability of the aircraft launched rocket has been investigated. In a program already under way, the Air Force will utilize an 8-in. rocket to carry 40 lb to about 40 mi while retaining the mobility allowed by a completely airborne operation. *Subject Headings:* **1. Rockaire program 2. Rocket launching from aircraft.**—*Author's abstract.*

9.4–85 551.507.362.1

Townsend, John W., Jr. and Slavin, Robert M., **Aerobee-Hi development program.** *Jet Propulsion*, 27(3):263–265, March **1957.** 3 tables. **DLC**—The Aerobee rocket has been extensively used in the past as a vehicle for upper air research. Newer versions of this rocket, especially designed for this type of experimentation will be used in the forthcoming International Geophysical Year program. One model, designated as the Air Force Aerobee-Hi, will be capable of carrying a 150-lb payload to approximately 150 mi. The other model, designated the Navy Aerobee-Hi, will carry a 150-lb payload to approximately 170 mi. Both rockets are described in detail. *Subject Headings:* **1. Aerobee rockets 2. Rocket development.**—*Authors' abstract.*

9.4–86 551.507.362.1

Vassy, E. (*Univ. of Paris*), **The French missile Veronique.** *Jet Propulsion*, N. Y., 27(3):285, March **1957.** fig. **DLC**—Veronique, originating from V-2, has four delta-shaped fins. The propellants are nitric acid and turpentine. The weight, before firing, is one ton. The telemetering system has 20 channels. Of the 15 rockets which have been fired, the maximum height reached is 135 km. *Subject Heading:* **1. Veronique rockets.**—*Author's abstract.*

9.4–87 551.507.362.1

Zimney, Charles M., **The ASP, a single-stage solid propellant sounding rocket.** *Jet Propulsion*, N. Y., 27(3):274–275, March **1957.** 6 figs. **DLC**—The ASP is a single-stage solid propellant sounding rocket 6½ in. in diam. and 12 ft long. It is capable of transporting a 550 cu in. payload weighing 25 lb to an altitude of 200,000 ft. When launched from sea level, burnout velocities of the order of 5700 fps have been experienced. At White Sands Proving Grounds, as a staged vehicle employing a Nike booster as the first stage, the ASP is capable of reaching 850,000 ft. In addition to its capabilities as a sounding vehicle, the ASP can also be utilized as an aerodynamic test vehicle either as a single stage, a multiple-stage, or a clustered vehicle. Fifty-one flight tests have been made with a perfect reliability record of 100% successful firings. *Subject Headings:* **1. ASP rockets 2. Rocket launching.**—*Author's abstract.*

INSTRUMENTS

See also: **Radiosonde comparisons** (Malet), 9.4–12; **Wind effects on snow gages** (Warnick), 9.4–15; **Met. instruments** (Glaser), 9.4–37; **Satellite instrumentation** (Ziegler), 9.4–46; **Balloon borne anemometers** (Ripken), 9.4–79; **Rockair** (Ross, Masterson), 9.4–82; **Automatic cloud seeding** (Bilancini), 9.4–110; **Evaporation measurements** (Uhlig), 9.4–179; **Polarimetry** (Cialdea), 9.4–2

9.4–88 551.508.23

de Quervain, M. (*Institut Fédéral pour l'Étude de la Neige et des Avalanches, Davos*), **Ein neuer Tagbogenschreiber.** [A new solar trajectory recorder.] *La Météorologie*, Paris, Ser. 4, No. 45/46:371–377, Jan./June **1957.** 5 figs., 3 eqs. German, French and English summaries p. 371. **DWB**—A new instrument, a recording theodolite, is described which allows to establish the maximum possible annual sunshine of a given location in one operation. In guiding the telescope along the sky-line, the total field of the sun's trajectories appear as aequidistant straight lines. In order to get the maximum possible duration of sunshine for any period a simple planimetration of the diagram is necessary. This instrument shortens considerably the time required for taking and processing measurement of this kind. Its field of application

involves climatology, hydrology and architecture. *Subject Heading:* **1. Sunshine recorders.**—*Author's abstract.*

9.4–89 551.508.23:551.521.11

Riblet, J. (*Inst. des Etudes rhodaniennes, Univ. de Lyon, France*), **Le "perspectographe stéréographique Riblet" appliqué à la determination de la durée maximum possible d'insolation en montagne.** [Riblet's "stereographic perspectograph" applied to the determination of maximum possible sunshine duration in mountains.] *La Météorologie*, Paris, Ser. 4, No. 45/46:329–334, Jan./June **1957.** 5 figs., 16 refs. French, English and German summaries p. 329. **DWB**—The importance of the exposure factor in high mountains is recalled in a few words, also the main instruments used up to date for the determination of the maximum duration of sunshine. The method of RIBLET's stereographic perspectograph is described. The extremely simple instrument permits one to draw quickly in a continuous line, the "sweep of the horizon" in stereographic projection. By superposition of an overlay showing the sun's path during the different months and the hour circles, one can easily read, for any required day, the duration of the solar eclipses by terrestrial obstacles. These results can be used to determine the heliothermic microclimate of a station point, if the actinometric factors of the regional climate are known. Applications: Determination of the ablation of snow-fields and glaciers from a river basin. Solution of different important architectural problems in high mountains. *Subject Headings:* **1. Stereographic perspectographs 2. Maximum possible sunshine duration.**—*Author's abstract.*

9.4–90 551.501.7:551.508.27:551.521:551.524

Band, G. (*Met. Inst., Univ. of Cologne, Germany*), **Strahlung und Temperaturmessung über Schnee.** [Radiation and temperature measurement over snow.] *La Météorologie*, Paris, Ser. 4, No. 45/46:364–369, Jan./June **1957.** 7 figs., 2 refs. German, French and English summaries, p. 364. **DWB**—The influence of radiation on the readings of a mercury thermometer and of thermoelements with or without protection against radiation is studied in the case of measurements above a layer of snow. If measurements are made with a chromium-plated, polished thermoelement, a protection against radiation is necessary in the case of great intensity, but when radiation is weak and during the night, no such protection is necessary. *Subject Headings:* **1. Radiation effects on temperature measurements 2. Temperature over snow surface 3. Shielded thermometers.**—*Author's abstract.*

9.4–91 551.508.53/4

Sanuki, M. (*Central Met. Obs.*), **Wind tunnel experiment on a cylindrical anemometer.** *Papers in Meteorology and Geophysics*, Tokyo, 6(1):5–7, May **1955.** 4 figs., ref. **DWB**—An experimental anemometer with three semi-circular cylindrical shells with open ends is tested in wind tunnel for its rotational speed in tilted attitudes. This is to clarify the proposal of I. FUJIMURA to install such type at mountain stations to be free from strong up-wash effect of wind often encountered. The results are disappointing and the standard three-cup anemometer is found to give rather constant rotational speed in spite of up-wash or down-wash. *Subject Headings:* **1. Wind tunnel experiments 2. Cylindrical anemometers.**—*Author's abstract.*

9.4–92 551.501.777:551.508.77

Furlan, D. (*Meteorologist, Liubliana, Yugoslavia*), **Die Ergebnisse der Messungen mit Totalisatoren in den Julischen Alpen.** [Results of measurements with totalizers in the Julian Alps.] *La Météorologie*, Paris, Ser. 4, No. 45/46:151–152, Jan./June **1957.** German, French and English summaries, p. 151. **DWB**—The results received from totalisators, in Yugoslavia are very satisfactory. The amount of precipitation in the Julian Alps is about 4000 mm, while, until now, the amount was estimated 3000 mm. *Subject Headings:* **1. Precipitation totalizers 2. Julian Alps.**—*Author's abstract.*

9.4–93 551.501.777:551.508.77:551.577:551.556

Grunow, J. (*Met. Obs., Hohenpeissenberg, Germany*), **Erfassung des winterlichen Niederschlags im Gebirge.** [Measurement of winter precipitation in mountains.] *La Météorologei,*

Paris, Ser. 4, No. 45/46:117–126, Jan./June **1957.** 3 figs. (incl. photo), 4 tables, 19 refs. German, French and English summaries p. 117. **DWB**—The measurement of winter precipitations in the mountains is difficult. To eliminate the influence of the wind, a new totalisator model with a screen made of thin blades has proved to be successful. The content of these totalisators agrees satisfactorily with the water equivalent of the layer of snow. The hydrological balance requires as accurate results as possible even for a limited region. It is necessary to consider the effect of the slope and to adjust the opening parallel to the ground as well as to choose a representative location. Measurements made in depressions of the terrain and in closed basins give a false picture of the increase with altitude because the additional amount of snow carried by the wind changes the results. It is necessary to complete the rainfall measurements and deduce the winter precipitation from the water equivalent of the snow layer. *Subject Headings:* **1. Precipitation measurement 2. Precipitation totalizers 3. Wind effects on precipitation measurements.**—*Author's abstract.*

9.4–94 551.508.77:551.578.4

Inoue, R. and Sanbongi, R., **On the catching characteristics of a snow gage.** *Journal of Meteorological Research,* Tokyo, 7(11):734–739, Dec. **1955.** 7 figs., table, 4 refs., 3 eqs. In Japanese; English summary p. 734. **DWB, DLC**—Catching characteristics of the C.M.O. standard snow gage were studied, compared with the snow that fell on the ground near the gage. At the beginning of a snowfall, a wooden board and a canvas-covered board were set flush on the old snow surface. Immediately after the snowfall, a 20-cm diameter snow tube was pushed into the snow that was collected on the boards, the weight of snow was determined and measurement was made of the precipitation caught in the gage to be examined, to allow a comparison. Another method to make a base surface is to scatter dye powder on the old snow surface. But this method was unsatisfactory because subsidence had occurred on the scattered surface and many measurements had been necessary, owing to local differences of the subsidencial depth. Therefore, the wooden and canvas-covered boards were used usually and their average was considered to be the true precipitation. Observed results indicate the decrease of catch with the increase of mean wind velocity, and the catching rates were about 90% and 80% when the mean wind velocities near the gage funnel were about 0.5 m/sec and 1.5 m/sec, respectively. Owing to topography, the data were lacking when the mean wind velocity was more than 1.67 m/sec. *Subject Headings:* **1. Snow gages 2. Snow cover measurements.**—*Authors' abstract.*

9.4–95 551.508.77:551.578.46

Morel, Paul (*Electricité de France, Lyon*), **Contrôle des résultats d'un réseau de nivo-pluviomètres totalisateurs.** [Control of measurements of a network of totalizers.] *La Météorologie,* Paris, Ser. 4, No. 45/46:133–140, Jan./June **1957.** 6 figs. French, English and German summaries p. 133. **DWB**—Since 1948, the "Service de la production hydraulique d'E.D.F." has set out for its own needs, to complete and to improve the network of totalizators, which the "Water and Forest Service" had organized since Mougin's first work. The examination of the first results obtained has led to the modification of the material and the operational technique of the measurements. We have tried to find a more resistant standard material, to eliminate the sources of errors (vandalism, leakage of reservoirs), and to facilitate the measurements in such a way as to increase their accuracy. At the same time, we have tried to follow more closely the exploitation of the results by taking as many measurements as possible and systematically controlling the precipitation values by comparing them with measurements effected with other instruments. In particular, for the control of solid precipitations collected during the winter, we have made systematical comparisons with the values of the water equivalent of the layer of snow measured near the instruments by sampling. The paper shows what conclusions can be drawn from a certain number of these controls pertaining to instruments in different parts of the Alps. *Subject Headings:* **1. Precipitation totalizers 2. Instrument comparisons.**—*Author's abstract.*

9.4–96 551.508.77:551.501.77

Pašić, H. (*Hydrometeorological Service, Sarajewo, Yugoslavia*), **Méthodes employées pour mesurer les précipitations dans les régions montagneuses.** [Methods of precipitation meas-

urement in mountain areas.] *La Météorologie*, Paris, Ser. 4, No. 45/46:143–149, Jan./June 1957. 4 figs. (incl. photos), 2 tables, 8 refs. French, English and German summaries, p. 143. **DWB**—The measurement of the volumes of real precipitations falling to the ground is made possible, in high mountains, by the use of the method of lowering the gauge orifices or by the use of shelter devices on ordinary raingauges. The results of measurements made at Bjelasnica mountain observatory (2067 meters altitude), according to the first method, a gauge with an aerodynamic wing, turning on a vertical axis and thus reducing the turbulence and the Jevans effect, has been used. In the case of isolated measurements, the differences are sometimes important, but it is necessary to pursue the comparing measurements for the purpose of studying the instrument. The precipitation measurements made with raingauges with inclined orifices on mountain slopes, have, in various cases, shown specific differences which are published in a special table. *Subject Headings:* **1. Precipitation measurement 2. Rain gage shields 3. Rain gage comparisons.**—*Author's abstract.*

9.4–97 551.501.777:551.508.77:551.556

Vanni, M. (*Met. Inst. Munich*), **Mesures des précipitations et emploi des nivopluviomètres en haute montagne.** [Precipitation measurement and use of precipitation gages in high mountains.] *La Météorologie*, Paris, Ser. 4, No. 45/46:127–131, Jan./June 1957. 2 figs., table, 2 refs. German, French and English summaries p. 127. **DWB**—The gathering of data on snow and rainfall forms a problem which, under many aspects, has not yet found its solution. The author proposes to particularly contribute to the problem of the best location of the instrument, so that it gathers a quantity of the precipitation which bears a real proportion to the quantity falling on the ground. The author calls attention to the measurement of precipitations in wind, which frequently blows in the mountains and often with considerable force, so that the snow falls obliquely and the snow gauge is not always able to catch it. Measurements thus made with the usual fixed vertical snowgauges cannot give exact readings. If, on a vast surface the slant of the falling snow has no appreciable effect, the difference on the much smaller surface of the snowgauge may be quite considerable. The author has therefore carried out a number of measurements at the Lake Goillet meteorological station (alt. 2526 meters), with two rain gauges: one of the fixed vertical type and the other inclined according to the slant of the snow caused by the wind. The taking of these measurements occupied a period of 8 months. The data gathered showed, on the whole, that when the snow falls slantwise through the effect of the wind, the difference in the measurements is appreciable. Thus at the end of the 8 months, the total snowfall registered by the fixed vertical gauge was 803.8 mm, whilst that shown by the inclined gauge was 857.8 mm. In order to have still more accurate measurements, which are still subject to great error, a type of snow and raingauge should be designed which could incline and direct itself automatically according to the slant of the snow and the direction of the wind. *Subject Headings:* **1. Precipitation measurements 2. Precipitation gages 3. Wind effects on precipitation measurement 4. Tilted rain gages.** —*Author's abstract.*

SYNOPTIC ANALYSIS AND FORECASTING

See also: **Dynamic and physical met.** (Haltiner, Martin), 9.4–5; **Operation Deepfreeze I,** 9.4–21; **Agromet. forecasting** (Popov), 9.4–27; **Thunderstorm forecasting** (Desai), 9.4–127; **Atmospheric disturbances, India** (Chakravorthy, Basu), 9.4–128; **Forecasting visibility in rain** (Poliakova), 9.4–262.

9.4–98 551.509.2

Great Britain. Meteorological Office, **Some typical weather maps.** London, H.M.S.O., 1957. 8 p. 8 figs. At head of t.p. M.O.632. **DWB**—Example of weather map for British Isles and North Sea with coded report, plotting and notes on symbols. Then 7 maps showing summer and autumn anticyclones, shallow secondary, trough, ridge, col and depression. *Subject Heading:* **1. Weather map reproduction.**—*C.E.P.B.*

9.4–99 551.509.326:551.515.4

§Lines Escardo, Alberto, **Notas acerca de los temporales que afectaron a la Peninsula Ibérica durante el primer trimestre del año 1956.** [Notes on thunderstorms that affected

the Iberian Peninsula during the first quarter of 1956.] *Revista de Geofísica*, Madrid, 15(60): 477–490, Oct./Dec. **1956.** 11 figs. **DWB**—Eight series of thunderstorms occurred over the Iberian Peninsula during the period reported. The synoptic development of each situation is described and surface and upper-air charts are presented. Five of the storms were associated with Atlantic type circulation, three with northerly circulation. *Subject Headings:* **1. Thunderstorm frequencies 2. Synoptic conditions for thunderstorms 3. Iberian Peninsula.**—*G.T.*

9.4–100 551.509.312:551.515.2

Itoo, H. and Masuda, Y. (*both, Met. Res. Inst.*), **The numerical prediction of the typhoon movement by the relay computer.** *Papers in Meteorology and Geophysics*, Tokyo, 7(4):377–389, Jan. **1957.** 13 figs., 3 refs., 5 eqs. **DWB**—Using the relay computer, numerical predictions of the typhoon movement are performed by the barotropic model successively with many time steps of small time interval. In the problems of the typhoon prediction, the large truncation errors especially near the typhoon center seriously affect the forecast of typhoon movement. So, in this paper, to reduce such truncation errors, a certain smoothing procedure is taken and the barotropic forecast is applied to the smoothing map at 700 mb and 500 mb level. *Subject Headings:* **1. Numerical typhoon movement forecasting 2. Truncation errors.**—*Authors' abstract.*

9.4–101 551.509.318:551.589.1

Caděz, M. (*Univ. of Belgrade, Yugoslavia*), **Sur une classification des types de temps.** [A classification of weather types.] *La Météorologie*, Paris, Ser. 4, No. 45/46:317–323, Jan./June **1957.** 3 figs., 3 tables, 4 refs. French, German and English summaries, p. 317. **DWB**—Since there always exists, at any point in the atmosphere, some definite state of weather which, in the course of time, more or less changes, a classification of weather types in every point of the earth becomes necessary. From systematical observations of the weather evolution in the Alps, we have come to a classification of weather types which is based on the movement of the air in the lower layer of the troposphere. On this base we can define the following fundamental types: anticyclonic, advective (western, northern, eastern and southern), cyclonic and convective. Nearly every kind of weather may be simply classified according to these types and their combinations. Examples of how to use this classification in different places are then given. *Subject Headings:* **1. Weather type classification 2. Alps.**—*Author's abstract.*

9.4–102 551.509.318:551.589.1

Mertz, J., **Essai de classification des types de temps sur les Alpes d'après la disposition des isohypses à 500 mb.** [Attempt of a classification of weather types in the Alps according to the 500 mb contour pattern.] *La Météorologie*, Paris, Ser. 4, No. 45/46:305–315, Jan./June **1957.** 4 figs., 2 tables, 11 refs. French, English and German summaries, p. 305. **DWB**—Since the upper flow appears to be a determining factor in the weather of the Alps, and since the upper contours represent a simpler pressure pattern than at sea-level, it seems possible to utilize the direction of the flow at 500 mb as the first classification criterion of alpine weather types. A classification of this kind shows up in the influence on the precipitations of a certain well-organized upper wind regime. The paper includes a brief description of the situations aloft which determine the orientation of the isohypses in each system. Here, the main weather types shown in recent classifications for western Europe are found again. *Subject Headings:* **1. Weather type classification 2. 500 mb flow patterns 3. Alps.**—*Author's abstract.*

9.4–103 551.509.318:551.589.1:551.515.8

Schuepp, M. (*Swiss Inst. of Met., Zürich*), **Klassifikationsschema, Beispiele und Probleme der Alpenwetterstatistik.** [Classification system, examples and problems of Alpine weather statistics.] *La Météorologie*, Paris, Ser. 4, No. 45/46:291–299, Jan./June **1957.** 5 figs., 3 tables. German, French and English summaries, p. 291. **DWB**—According to the recommendations of the congress held at Davos in 1954, statistics of weather-types in the Alps have been worked out; the underlying classification system is briefly exposed. As an example, the climatological analysis of the month of January during a period of 15 years is given. The frequency distribution of the relative topography 1000/5000 mb shows the existence in the Alps of two main air masses, viz. tropical air and polar air. *Subject Headings:* **1. Weather type classification 2. Climatic analysis 3. Air masses 4. Alps.**—*Author's abstract.*

9.4–104 551.509.324.2:551.579

Martel, L. (*Electricité de France, Lyon*), **Utilisation des données pluviométriques pour la prévision des apports dans les réservoirs de haute montagne.** [Use of precipitation data in forecasting water supply for reservoirs in high mountains.] *La Météorologie*, Paris, Ser. 4, No. 45/46:153–160, Jan./June **1957.** 4 figs., eq. French, English and German summaries p. 153. **DWB**—Since 1949, the "Service de la Production Hydraulique d'E.D.F." has worked out the forecasting of the streamflow of the watersheds feeding the reservoirs. This forecasting is based on the study of the correlations between the streamflow to be forecast and a combination of elements characterizing the hydrological situation at the beginning of the forecast period. These elements include, in particular, the value of the measured precipitations in the watershed or its vicinity. For this purpose, E.D.F., on the one hand expanded the existing network of climatological stations and improved the quality of the observations; on the other hand it collected all historical data and proceeded to their systematical control. The paper shows the benefit our industry can derive from these forecasts for a rational exploitation of the hydroelectric power stations. *Subject Headings:* **1. Water supply forecasting 2. Stream flow 3. Precipitation data.**—*Author's abstract.*

9.4–105 551.509.57:551.515.2

Riehl, Herbert (*Univ. of Chicago*), **The motion of tropical storms.** (In: Tropical Cyclone Symposium, Brisbane, Dec. 1956, **Proceedings.** Pub. Dec. **1956.** p. 301–308. 11 refs.) **DWB**—External and internal mechanisms of propagation, methods of path prediction, the problem of observations, etc. concerning tropical cyclones are discussed. The concept of vortex interaction (as contrasted with the old idea of a steering current in which the cyclone is embedded) accounts for the cases where the cyclone becomes intense enough to "form its own steering current" as some have hypothesized. Not only cyclones and anticyclones interact on each other, but pairs of cyclones (vortex pairs) interact in a spectacular manner occasionally. Asymmetry of circulation, quantitative methods now being tested, synoptic-statistical techniques, numerical prediction attempts, and finally the lack of data are considered. *Subject Headings:* **1. Tropical cyclone movement forecasting 2. Tropical cyclone steering.**—*M.R.*

9.4–106 551.509.53:551.515.8

Katayama, A., **Relation between the outbreak of Arctic air mass and the variation of latitudinal distribution of vorticity.** *Journal of Meteorological Research*, Tokyo, 9(5):314–321, July **1957.** 7 figs., 2 tables, 11 refs., 10 eqs. In Japanese; English summary p. 314. **DWB, DLC**—From the time isoplets of daily latitudinal distribution of 500 mb zonal vorticity averaged over 110~150°E every 5° latitude from 10°N to 90°N, for the period Dec. 1954 to Feb. 1955, remarkable southward trends of positive zonal vorticity are found and this phenomena is related to a large scale outbreak of the Arctic air mass. And then the sources of that positive vorticity seem to exist in easterly zone over 60~70°N. J. Holmboe has given the equilibrium condition of a cold core centered at the pole. Applying his condition to a simple model, one condition of the outbreak of Arctic air mass is given as follows: The arctic air mass has a tendency to outbreak by the increasing positive vorticity (cyclonic wind shear) and by decreasing mean zonal wind, on the southward edge of Arctic air mass. Taking into consideration these facts, we can perform the medium range forecasting of cold wave outbreak with considerable accuracy. *Subject Headings:* **1. Cold wave forecasting 2. Arctic air masses 3. Vorticity.**—*Author's abstract.*

9.4–107 551.509.532

Sinha, K. L., **Prediction of minimum temperature at Delhi during winter from the temperature of the previous night.** *Indian Journal of Meteorology and Geophysics*, Delhi, 8(1):116–117, Jan. **1957.** 2 tables, 7 refs. **DWB, DLC**—In order to provide a quantitative value for use in minimum temperature predictions during winter, with respect to effect of cloud cover on fall in temperature from 2100h until sunrise, the records for Dec. and Jan. 1950–53 (4 years) for Delhi have been analyzed. For non-cloudy days (cloudless or high clouds only), 93% of the days had falls of 9°F±2°F in Dec. and 10°±2°F in Jan.; for cloudy days in Dec., 100% were within ±2°F of 4°F and for Jan. 89% were within ±2°F of 5°F. So it is safe to

forecast that the minimum will be 9 or 10° lower than the 2100 h local time temperature on clear and 4 or 5° lower than the 2100 h temperature on cloudy nights. (Extreme values were 14°F on clear and 6°F on cloudy nights.) *Subject Headings:* **1. Minimum temperature forecasting 2. Objective minimum temperature forecasting 3. Cloudiness effects on minimum temperatures 4. Delhi, India.**—*M.R.*

9.4–108 551.509.58:551.579.4

Moran, P. A. P., **The statistical treatment of flood flows.** *American Geophysical Union, Transactions*, 38(4):519–523, Aug. **1957.** 2 tables, 2 refs., 11 eqs. **DWB, DLC**—The estimation of return periods of floods is considered from the point of view of mathematical statistics. This requires, essentially, the estimation of the tail of a probability distribution from a sample of values which is usually not dense in this tail. The error in the estimation of a flood corresponding to a given probability arises from two sources: (1) the uncertainty as to the mathematical form of the distribution; (2) the uncertainty arising from the statistical errors of estimation of the parameters of the distribution which occur because of the finiteness of the length of record. These errors are illustrated on a numerical example by fitting a log-normal distribution and a type III distribution to fifty annual values of extreme monthly flow of the River Murray. *Subject Headings:* **1. Flood probability 2. Statistical analysis.**—*Author's abstract.*

9.4–109 551.509.58:551.579.4

Szesztay, Károly, **Az árvízi elörejelzések néhány modszertani kérdése.** [Some methodological problems of flood forecasting.] *Hungary. Vízgazdálkodási Tudományos Kutató Intézet, Beszémoló . . . évi munkájáról*, 1955:147–174, pub. **1956.** 19 figs., 2 tables, 10 refs., 13 eqs. Figs. (with English captions). Russian, English and German summaries p. 308–310. **DWB**—A graphical method of correlation calculation for water level forecasting is explained. Up to seven variables are represented by a series of curves which are arranged coaxially into a composite graph. By starting with the proper value of the first parameter (represented on a scale at the left side of the chart) and drawing straight (alternatively horizontal and vertical) lines to the proper values of the other parameters, the forecast value is obtained on a scale at the base or the right side of the graph. The parameters considered include various gage relationships, channel storage and precipitation. The diagrams presented show applications of the method to forecasting for the Danube in Hungary from data for Austria and Hungary. With the help of these diagrams (developed in 1955) flood stage forecasts can be prepared 3 to 10 days ahead (depending on the location of the station) for all stations in Hungary. *Subject Headings:* **1. Flood forecasting 2. Graphical presentation 3. Danube River, Hungary.**—*G.T.*

ARTIFICIAL PRECIPITATION

9.4–110 551.509.617:551.508.765

Bilancini, Raoul, **Semina automatica delle nubi.** [Automatic cloud seeding.] *Rivista de Meteorologia Aeronautica*, Rome, 17(2):67, April **1957. DLC**—Report on Australian experiment with a AgI generator on a DC-3 (RAAF), which is also equipped with a liquid water content meter. *Subject Headings:* **1. Air-borne AgI smoke generators 2. Liquid water content meters 3. Cloud seeding with silver iodide 4. Australia.**—*M.R.*

9.4–111 551.509.617(09)

Byers, Horace R. (*Chic. U.*), **Historical resume of research relating to weather modification.** (In: Conference on the Scientific Basis of Weather Modification Studies, Arizona Univ., Tucson, April 1956, **Proceedings.** pub. **1956.** 8 p. 3 refs.) **DWB?**—Early attempts at modifying the weather or producing rain (1839–1945) are reviewed, the scientific studies of rain forming or of cloud physics processes which made possible the advances since 1946 when Schaefer et al. made their first dry ice (and later silver iodide) experiments, Project Cirrus, tropical (warm) rain formation and other phases of cloud physics research in many countries are reviewed, with special reference to the 3 bibliographies on cloud physics and rain making in Vol. I and VI of MAB. *Subject Headings:* **1. History of cloud seeding 2. Cloud physics research 3. Artificial precipitation experiments.**—*M.R.*

9.4–112 551.509.617

*Rain Stimulation Research Institute, Taipei, Taiwan, China, **Second report on cloud-seeding experiments over Sun Moon Lake area, 1951–1954.** Issued April **1956.** 22 p. 22 figs., 7 tables. **DWB** (M09.67 R154c)—Cloud seeding experiments in the Sun Moon Lake area have been conducted since Jan. 1951. Airplanes were used up to Nov. 1952 and ground-based AgI generators since that time. Results up to the end of 1952 were published in a first report dated May 1953. This second report covers the dry seasons Nov. 1952–Feb. 1953 and Jan.–March 1954. The results are evaluated by means of a standard method of rainfall correlations between stations in the target and control areas (regression lines are presented). An overall increase of 15% during the entire period of operation (1951–1954) is claimed for the target area. Technical details like distribution of generators, timing of operations and laboratory research on seeding agents are discussed. *Subject Headings:* **1. Cloud seeding in Formosa 2. Formosa.**—*G.T.*

9.4–113 551.509.617

Ramanathan, K. R. (*Physical Research Lab., Ahmedabad*), **Organization required for planned experiments on artificial rainfall in India.** (In: Symposium on Artificial Rain, New Delhi, Feb. 1953, **Proceedings and Papers.** pub. **1955.** p. 127–128.) **DWB**—Requirements for a research unit to study cloud seeding are outlined. Assistance from the Indian Air Force in cooperation with the Meteorological Department and a statistician, and with bases at Jodhpur, Ranchi and Hyderabad are suggested. Laboratory work in universities should also be conducted. *Subject Headings:* **1. Cloud seeding research 2. India.**—*M.R.*

STRUCTURE AND PHYSICS OF THE ATMOSPHERE

COMPOSITION OF THE ATMOSPHERE

9.4–114 551.510.41:546.214

Fedotov, V. P., **Opredelenie dvuokisi azota v vozdukhe pri pomoshchi 2-etoksi-6,9-diaminoakridinlaktata.** [Determinations of NO_2 in air by means of 2-ethoxy-6,9-diaminoacrydinlactate.] *Gigiena i Sanitariia*, Moscow, 21(9):85–86, Sept. **1956.** table. **DLC**—The use of 2-ethyoxy-6,9-diaminoacrydinlactate for determining the amount of NO_2 in the air is carried out by using a previously prepared tube containing silica gel impregnated with a solution of this reagent and $KHSO_4$. The sensitivity of the reaction necessitates a scale within the limits of 0.004–0.10 mg/l of NO_2 per 1 liter of air. *Subject Heading:* **1. NO_2 measurements.** —*I.L.D.*

STRUCTURE OF THE ATMOSPHERE

9.4–115 551.510.5:551.513.1

Long, Robert R., **Models of small-scale atmospheric phenomena involving density stratification.** *U. S. Office of Naval Research, Proceedings of the First Symposium on the Use of Models in Geophysical Fluid Dynamics, Sept. 1953.* pub. **1956.** p. 135–147. 10 figs., 20 refs., 38 eqs. Also reprinted as Johns Hopkins Univ. Dept. of Civil Engineering, Contract Cwb 8521, Technical Report, No. 7, **1956. DWB**—Theoretical and laboratory models for demonstrating characteristics of flow over barriers, using stratified fluids, are elaborated. Difficulties due to incompressibility of fluids used in models are discussed, but no detailed comparison has yet been made of the compressible and incompressible cases. A rough comparison, however, shows the difference between the 2 cases to be of no great consequence. A nice inversion appears in both cases and there is the same tendency for 2 distinct regimes of motion (subcritical and supercritical). *Subject Headings:* **1. Orographic effects on fluid models 2. Atmospheric models.**—*M.R.*

9.4–116 551.510.52:551.571.7

Dobryshman, E. M., **O zonal'nom raspredelenii vlazhnosti v troposfere.** [Zonal distribution of moisture in the troposphere.] *Meteorologiia i Gidrologiia*, No. 12:18–25, Dec. **1956.** 6 figs., 3 refs., 13 eqs. **DWB, DLC.** Trans. into English available. **DWB** (M10.52 D634zo). 13 p. 6 figs., 3 refs. (in Eng.), 13 eqs.—Proceeding from the equation of the

transport of moisture the author attempts to determine the zonal distribution of humidity in the troposphere on the basis of I. A. KIBEL's concept that the distribution of moisture in the atmosphere is determined by horizontal and vertical turbulent exchange and by "currents" of moisture which take into account the total fall-out of moisture in the form of precipitation; the thickness of these currents is selected in such a way that the distribution of moisture with height averaged for the entire terrestrial atmosphere can be expressed by the Hann-Suring formula: $E=E_0e^{-\frac{z}{L_1}}$. The moisture characteristic is represented by the dewpoint. The equations for zonal distribution of humidity are developed and solved and the distribution of humidity with latitude is presented graphically and at various levels for specific months on charts. *Subject Headings:* **1. Tropospheric humidity 2. Humidity distribution 3. Zonal distribution of humidity.**—*I.L.D.*

9.4–117 551.510.528:551.557.5:551.577

§*Badner, Julius and Johnson, Melvin A. (*Nat. Wea. Analysis Center, U. S. W. B., Wash., D. C.*), **Relationship of tropopause and jet streams to rainfall in southeastern United States, Feb. 4–9, 1957.** *Monthly Weather Review*, Wash., D. C., 85(2):62–68, Feb. **1957.** 5 figs., table, 9 refs. **DWB, DLC**—A series of charts for Feb. 4, 7 & 9, 1957 are analyzed to show surface isotach, jet stream, tropopause height and a cross section across the U. S. at a time when heavy rains occurred in a belt from Texas to the Middle Atlantic States. Relation of the tropopause breaks and jet stream to the waves are clearly shown and discussed. *Subject Headings:* **1. Tropopause-jet stream-rainfall relationships 2. S.E. United States.**—*M.R.*

UPPER ATMOSPHERE—IONOSPHERE

See also: **Ionospheric winds observation, India** (Rao et al.), 9.4–171; **F_0F1 variations during eclipses** (Burkard), 9.4–252; **Solar eclipse, Oct. 1957** (Gossner), 9.4–253; **Radiation measurements during eclipse** (Minnis), 9.4–254; **Eclipse effects on ionosphere** (Muo), 9.4–255; **Eclipse effects, June 1954 and 1955** (Rastogi et al.), 9.4–257; **Ionospheric recombination** (Rawer), 9.4–258; **Solar eclipse, June 1954** (Weekes), 9.4–259; **Ionospheric electron diffusion** (Mariani), 9.4–270.

9.4–118 551.510.534:551.547

Kawamura, K. (*Met. Res. Inst., Japan*), **The atmospheric ozone in relation to upper meteorological conditions.** *Papers in Meteorology and Geophysics*, Tokyo, 7(4):393–399, Jan. **1957.** 4 figs., 9 refs. **DWB**—The relations between the amount of atmospheric ozone observed at Tokyo for the period from 1953 to 1955 and the upper meteorological conditions were studied. Day-to-day variations of the ozone amount are generally explained with the conception of upper pressure pattern, that is a high ozone amount near a trough and a low amount near a ridge. But, in addition to this the vertical motions of the upper atmospheric air accompanied by a jet stream may be considered as a secondary effect. Moreover, in the southern-most region of the trough at 300 mb level, ozone variations were essentially small. The result shows that in this region the intensity of the vertical motions of the air contributing to ozone variation is less than in the other regions of the trough. *Subject Headings:* **1. Ozone amount 2. Upper air pressure-ozone amount relationships 3. Tokyo, Japan.**—*Author's abstract.*

9.4–119 551.510.535:551.594.12

Lepechinsky, D. (*Nat. Lab. of Radioelectricity, Bagneux/Seine*), **L'évaluation de la densité électronique dans la région E.** [Evaluation of the electronic density in the *E* region.] (In: **Solar eclipses and the ionosphere: a symposium** . . . ed. by W. J. G. Beynon and G. M. Brown. London, Pergamon, **1956.** p. 293–299. 4 figs., 3 refs., 8 eqs.) **DWB**—From the point of view of propagation it is important to distinguish two very different regions in the ionosphere: an upper region where the collisional frequency is small and propagation is "quasi-transverse" (Q.T.), and a lower region where the collisional frequency is greater than a certain critical value and propagations is "Quasi-longitudinal" (Q.L.). The altitude of the limit between these two regions varies with the angle between the direction of propagation and that

of the terrestrial magnetic field. For latitudes of France, for vertical incidence, the limiting Q.T.-Q.L. level is situated at about 95 km. Since the vertical incidence reflection conditions for the ordinary ray in the Q.T. and Q.L. regions are different, these considerations have an important bearing on the evaluation of the electron density in the E layer from values of $f_0 E$. The error involved in N using the "classical" Q.T. condition when Q.L. condition is appropriate can be 30 per cent or more. *Subject Heading:* **1. Electron density in E layer.**—*Author's abstract.*

9.4–120 551.510.535

Menzel, D. H.; Wolbach, J. G. and Glazer, H. (*all, Harvard College Obs., Cambridge, Mass.*), **The E layer of the ionosphere.** (In: **Solar eclipses and the ionosphere: a symposium** . . . ed. by W. J. G. Beynon and G. M. Brown. London, Pergamon, **1956.** p. 279–292. 6 figs., 5 tables, 3 refs., 9 eqs.) **DWB**—Part I considers an extended physical theory of a stratified static ionospheric layer. The equations derived are used in Part II, which gives a statistical analysis of combined data for the E region for the sunspot cycle 1944–53 derived from a large number of stations. Results are compared with those obtained from a similar but more limited study by HARNISCHMACHER. *Subject Headings:* **1. E layer 2. Sunspot cycles.**—*Authors' abstract.*

9.4–121 551.510.535

Rawer, Karl, **Bemerkungen zur Meteorologie der Ionosphäre.** [Remarks on meteorology of the ionosphere.] *Germany. Deutscher Wetterdienst, Berichte,* 4(22):83–84, **1956.** fig. **DWB, DLC**—In this brief note on the ionosphere above a height of 120 km the author discusses the daily variation of electron density, horizontal motions, apparent vertical motion and turbulence. *Subject Headings:* **1. Ionosphere 2. Ionospheric electron density 3. Turbulence in the ionosphere.**—*I.L.D.*

MECHANICS AND THERMODYNAMICS OF THE ATMOSPHERE

See also: **Dynamical and physical met.** (Haltiner, Martin, 9.4–5; **Theoretical hydrodynamics** (Milne-Thompson), 9.4–7; **Baroclinic instability** (Fleagle, Izumi), 9.4–125.

9.4–122 551.511.33 551.524:551.525

†Berliand, T. G., **Teplovoĭ balans atmosfery severnogo polushariia.** [Thermal balance of the atmosphere of the North Hemisphere.] (In: Budyko, M. I. (*ed.*), **A. I. Voeĭkov i sovremennye problemy klimatologii.** Leningrad, **1956.** p. 226–252. 22 figs., 2 tables, 96 refs.) **DWB**—The author summarizes the various studies on the heat balance of the system earth-atmosphere and of the atmosphere that have been carried out since the work of SIR GEORGE SIMPSON on the distribution of terrestrial radiation. This is followed by an analysis of the spatial and temporal variations of the fundamental components of the heat balance of the atmosphere for the Northern Hemisphere. The four months, March, June, September and December, have been selected as the months best representing their characteristics. The calculation of the radiational balance is discussed in detail and appropriate equations used are presented. Charts are presented showing the radiational balance of the atmosphere for the above months, the annual turbulent flow of heat, heat of condensation for the given four months and annual heat of condensation, advective heat for these specified months and for the year, and the heat balance for the same months and for the year. Also, tables give data on the mean latitudinal variation of the monthly and annual radiational balance of the system earth-atmosphere and of its components. *Subject Headings:* **1. Heat balance of atmosphere 2. Radiation balance 3. Soil-air heat exchange 4. Northern Hemisphere.**—*I.L.D.*

9.4–123 551.511.33

Wexler, H. (*U. S. W. B., Wash., D. C.*), **Transport problems in the atmosphere.** *National Academy of Sciences, Proceedings,* 40(10):956–966, Oct. **1954.** 8 figs., 12 refs. **DWB**—A general discussion of the radiation, moisture and momentum balance of the earth, the latest schemes of the general circulation and air mass balance, the energy transport of the oceans and the proposed networks and programs of the IGY 1957/8 to solve some of the problems connected with these transport parameters. *Subject Headings:* **1. Transport problems in atmosphere 2. IGY program.**—*M.R.*

9.4–124 551.511.6:551.551.8

Elnesr, M., **La diffusivité turbulente dans l'atmosphère.** [Turbulent diffusivity in the atmosphere.] *Journal Scientifique de la Météorologie*, Paris, 6(23):119–121, July/Sept. **1954.** 6 refs., 6 eqs. Also: Saïssac, J., **Sur la mesure de la diffusivité atmosphérique.** *Ibid.*, 7(25): 211–212, Jan./Mar. **1955.** 2 refs., 4 eqs. **DWB**—Criticism of Saïssac (*see* 6.1–132, Jan. 1955, *MAB*) who uses analogy of molecular to turbulent diffusivity in formula for calculating effective diffusivity at height Z. It is shown that "h" or diffusivity is not constant, even for layers very close to the ground. The value of h for the profile of S, where S is the conservative quantity (temp., humidity or wind) should be:

$$h = k^2 \frac{(Z+d)S}{\log_e \frac{Z+d}{Z_0}}$$

where Z_0 and d are roughness parameters and $k=0.4$ (Von Karman's constant). Saïssac's article is an extension of Elnesr's. *Subject Headings:* **1. Turbulent diffusivity. I. Saïssac, J.** —*M.R.*

GENERAL CIRCULATION

See also: **Zonal index-climate relationships, Norway** (Breistein), 9.4–68; **Atmos. models** (Long), 9.4–115; **Tropical cyclone frequencies, North Atlantic** (Ballenzweig), 9.4–133; **Rotating dishpan models** (Fultz), 9.4–172.

9.4–125 551.513.1:551.511

§Fleagle, Robert G. and Izumi, Yutaka, **Empirical and theoretical studies of baroclinic instability.** Washington (State). Univ. Dept. of Meteorology and Climatology, Contract AF 19(604)-314, Scientific Report, No. 1, Sept. **1955.** 71 p. numerous figs., refs., and eqs. tables. On cover-page; Occasional Report, No. 3, Air Motions Study, 1. **DWB**—The first chapter contains a synoptic study, dealing with the vertical component of velocity associated with a cyclonic vortex. This is based on sea level, 700, 500 and 400 mb, covering U. S. and Canada, showing precipitation areas in addition to isobars and isotherms. Then an explicit and sufficiently simple criterion for baroclinic instability is derived, and critical curves are computed, substantially deviating from Charney's results. Y. Izumi presents a theoretical chapter on the effect of horizontal shear and finite lateral extent of disturbances, showing also the amplification of unstable waves. In conclusion, the baroclinic instability of a circular vortex is derived. *Subject Headings:* **1. Baroclinic instability 2. Vertical motion 3. General circulation 4. North America.**—*W.N.*

9.4–126 551.513.1

Van Loon, H., **Blocking action in the Southern Hemisphere, Pt. 1.** *South Africa. Weather Bureau, Notos*, 5(3):171–175, **1956.** 7 refs. **DLC**—An investigation of blocking situations in the Southern Hemisphere, based on five years of historical synoptic charts, shows that they are rather common. If they persist for at least six days this happens only in three well-defined parts of the hemisphere, viz. Eastern Australasia-Western South Pacific Ocean, the Scotia Sea, and the region between Marion and Crozet Islands in the Indian Ocean. These positions are all to the east or southeast of a continent in contrast with conditions in the Northern Hemisphere, and the arguments advanced by investigators in the Northern Hemisphere to explain the geographical distribution of blocking there apparently fail to explain the distribution in the Southern Hemisphere. It is assumed that the distribution of blocking in the south is connected with easy access to warm air which, when advected over the migratory highs of the westerlies, might stabilize them in a position favourable for further flow of warm air. The yearly trend of blocking in the Southern Hemisphere shows a pronounced maximum during late winter-early spring, a characteristic which is found in the Northern Hemisphere too. Blocking in the Southern Hemisphere sometimes occurs in two or three preferred areas at the same time, and there is a tendency for it to spread downstream, particularly from the region in Eastern Australasia-Western South Pacific Ocean. *Subject Headings:* **1. Blocking action 2. Southern Hemisphere.**—*Author's abstract.*

9.4–127 551.513.2:551.557.5:551.509.317:551.515.3/4(54)

Desai, B. N. (*Met. Office, Poona*), [**Comments on**] **C. Ramaswamy: On the sub-tropical jet stream and its role in the development of large scale convection; Reply by Ramaswamy.** *Tellus*, Stockholm, 9(1):135–136, Feb. **1957.** 3 refs. **DLC**—Desai takes exception to several points in Ramaswamy's paper (*see* 8.1–202, Aug. 1957, *MAB*) which attributes widespread thunderstorm and dust squall activity in Northern India and Pakistan during the pre-monsoon season to mass divergence associated with upper tropospheric vorticity patterns at 500 and 300 mb levels, and that these squalls can be predicted 12–24 hours in advance by this method. He claims that local orographic influences, insolation, etc. must be the dominant factors or else the storms would occur throughout the next 24 hours and not be confined to the afternoon and evening (20–24 hours after), and that the inversion is destroyed by insolation and not by subsidence. Ramaswamy replies that he has accounted for all of these factors in his paper, but that mass divergence always occurs during squally weather and convergence during fair weather. Hence these other factors which operate during both fair weather and foul, cannot be more than contributory factors. Divergence on the sub-tropical zone jet stream waves, when they come south at high levels over the moist tropical air masses, is considered the invariable factor and hence the only true aid to forecasting these storms. *Subject Headings:* **1. Thunderstorm forecasting 2. Subtropical jet stream 3. Divergence aloft 4. Northwest India 5. Pakistan.**—*M.R.*

ATMOSPHERIC DISTURBANCES

See also: **Sferics from tornadoes and hurricanes** (Dickson, McConahy), 9.4–71; **Thunderstorm frequencies** (Lines Escardo), 9.4–99; **Typhoon forecasting** (Itoo, Masuda), 9.4–100; **Weather classification and air masses** (Schuepp), 9.4–103; **Tropical cyclone movement** (Riehl), 9.4–105; **Cold wave forecasting** (Katayama), 9.4–106; **Subtropical jet stream and convection** (Desai), 9.4–127; **Barometric depressions, Scotland** (Geddes), 9.4–131; **Orographic cyclogenesis, Genoa** (Cădéz), 9.4–132; **Tornado models and inversion effects** (Ward), 9.4–157; **Wind field effects and squall lines** (Newton), 9.4–164; **Radar cloud obs.** (Feteris), 9.4–184; **Alpine meteorology** (Jalu, Pruvost), 9.4–246.

9.4–128 551.515:551.509.33(54)

Chakravortty, K. C. and Basu, S. C. (*both, Met. Off., Alipore, Calcutta*), **The influence of "western disturbances" on the weather over northeast India in monsoon months.** *Indian Journal of Meteorology and Geophysics*, Delhi, 8(3):261–272, July **1957.** 8 figs., 3 tables. **DWB, DLC**—Using data for 1950–54, the author discusses and illustrates how the western disturbances affect the weather of N.E. India during the monsoon season, especially with reference to forecasting for the foothill regions of Bihar, West Bengal and Assam. The onset of the monsoon in 1950, 51, 52, 53, and 54 is shown graphically to vary markedly from the normal, being advanced by easterly and retarded by westerly disturbances. *Subject Headings:* **1. Atmospheric disturbances 2. Monsoon forecasting 3. India.**—*M.R.*

9.4–129 551.515:551.578.48

Condet, J., **La situation météorologique et les avalanches.** [Weather situation and avalanches.] *La Météorologie*, Paris, Ser. 4, No. 45/46:49–63, Jan./June **1957.** 13 figs., table. French, English and Spanish summaries, p. 49. **DWB**—Apart from factors connected with the ground and snow itself (pre-existing amount, state, etc.) one has been wondering for a long time whether meteorological conditions play an important part in the releasing of avalanches. Studies made in the last few years already show that it is legitimate to answer in the affirmative. In fact, apart from the fact that the meteorological situation itself effects the state of the mantle of snow which is likely to cause the formation of avalanches, it certainly seems that in most cases the periods of large and multiple avalanches coincide with the passage over the area concerned of strong disturbances bringing up, apart from heavy snowfalls, warm air-currents and powerful winds. Two characteristic examples are studied in detail in the appendix. *Subject Headings:* **1. Weather effects on avalanches 2. Atmospheric disturbances.** —*Author's abstract.*

9.4–130 551.515(436)

*Hader, F., **Beiträge zur österreichischen Gewitterstatistik.** [Contribution to Austrian storm statistics.] *Wetter und Leben*, Vienna, 8(5/7):104–110, **1956.** 4 tables, 5 refs. **DWB**—A study of statistics for Austria for the period 1947–1955 based upon 7539 individual observations of storms. Data are presented on the annual variation of storm activity in Austria during this decade and include monthly total number of days with storms, mean monthly number of days with storms per station and mean relative areal extent of storm activity; weather situations and large storm activity during 1947–1955 and calendar of large storms for this period. There was a marked increase of storm activity from west to east whereby the southeastern provinces of Austria have the most storms. *Subject Headings:* **1. Storm data 2. Austria.**—*I.L.D.*

9.4–131 550.342:551.515.1(412.5)

*§Geddes, A. E. M., **Note on large microseisms recorded at Aberdeen on Dec. 9, 1954.** *Royal Astronomical Society, Monthly Notices, Geophysical Supplement*, 7(5):219–227, April **1957.** 3 figs., 3 tables, refs. **DWB, DLC**—A deep depression moved rapidly NNE from the Welsh coast across northern England to the Firth of Forth on Dec. 9, 1954. At the same time microseisms of very large amplitude were recorded at Aberdeen, the maximum effect occurring when the center of low pressure was situated over land. If the disturbances were due to standing waves set up in the sea in accordance with the Longuet-Higgins theory, these waves must have arisen behind the low center by reflection from the coast. There was no other low center in the neighborhood likely to produce the effects. So far as the nature of the microseisms is concerned, the records support the idea that they consist of a mixture of Rayleigh waves and Love waves, and that in the present case they approached Aberdeen from a direction approximately SSW of the station. *Subject Headings:* **1. Microseisms 2. Barometric depressions 3. Aberdeen, Scotland.**—*Author's abstract.*

9.4–132 551.515.11:551.515.711

Cădež, Marjan, **Über die orographische Zyklogenese und Antizyklogenese.** [Orographic cyclogenesis and anticyclogenesis.] *Germany. Deutscher Wetterdienst, Berichte*, 4(22):109–113, **1956.** 7 figs., 7 refs., eqs. **DWB ,DLC**—The phenomenon of the occurrence of cyclones over seas and plains, and anticyclones over mountains found in regions with large orographic barriers, is investigated with special reference to the Genoa cyclone. Also, the formation of orographic anticyclones is discussed. *Subject Headings:* **1. Cyclogenesis 2. Anticyclogenesis 3. Orographic influences 4. Genoa, Italy.**—*I.L.D.*

9.4–133 551.515.2:551.513.2

Ballenzweig, Emanuel M. (*U. S. Weather Bureau*), **Seasonal variations in the frequency of North Atlantic tropical cyclones related to the general circulation.** (In: Tropical Cyclone Symposium, Brisbane, Dec. 1956, **Proceedings.** Pub. Dec. **1956.** p. 57–70. 9 figs., 5 refs.) **DWB.** Also issued as: *U. S. Weather Bureau, National Hurricane Research Project, Report*, No. 9, July **1957.** 32 p. 34 figs., 4 tables, 9 refs. **DWB** (M15.2 U5845r)—Tropical cyclone frequencies in the North Atlantic and along the eastern seaboard of the United States are related to mean patterns of the general circulation of the order of a season. In some "hurricane seasons" certain regions are relatively free of tropical cyclones while other areas become unusually vulnerable. The planetary waves vary in form and position from one hurricane season to another and it is demonstrated by means of composite charts that these varying circulation patterns form the framework for steering tropical storms once they form and also play a role in determining their formation. *Subject Headings:* **1. Tropical cyclone frequencies 2. Cyclone-circulation pattern relationships 3. Cyclone steering 4. North Atlantic.**—*Author's abstract.*

9.4–134 551.515.2:551.556.8:532.59:551.46

Rosenblatt, Murray, **A random model of the sea surface generated by a hurricane.** N. Y. Univ. College of Engineering. Research Div., Contract Nonr-285(03), Technical Report, 56-1, Sept. **1956.** 22 p. 2 figs., 4 refs., 42 eqs. **DWB** (M15.2 R813r)—A random model of the sea surface generated by a fully developed stationary hurricane (presumably the

first adequate model of this kind) is proposed in a full mathematical treatment. With the help of this model, the state of the sea at a given distance from the hurricane center can be determined. If extended to moving systems and developing and dissipating storms it might prove suitable for practical forecasting of waves generated by hurricanes. *Subject Headings:* **1. Hurricane generated sea waves 2. Hurricane model 3. Forecasting waves generated by hurricanes.**—*G.T.*

9.4–135 551.515.3:551.556.1

Reynolds, George W. (*Engr. Res. Inst., Univ. of Mich.*), **A common wind damage pattern in relation to the classical tornado.** *American Meteorological Society, Bulletin*, 38(1, Pt. 1):1–5, Jan. **1957.** 3 figs., 4 tables, 16 refs. **DWB, DLC**—If a tornado is moving rapidly there may be no damage done by winds blowing toward the approaching center, as the forces may balance. This was evidently the case with 3 major tornadoes investigated by the author [Vicksburg, Waco and Wood River (Ill.) tornadoes of Dec. 1953, May 1953 and May 1949, respectively, where 157 people were killed all told] and 6 less important tornadoes. The damage usually builds up rapidly from right to left and then suddenly drops off to zero. Wind speed–pressure relationships are worked out theoretically and the effects of translation on total wind pressure calculated. Tables give resultants for different speeds of rotation and translation, for right and left side of path and force in a 36′×10′ wall for various wind speeds. *Subject Heading:* **1. Tornado damage patterns.**—*M.R.*

9.4–136 551.515.4(47)

Makhover, Z. M., **Zimnie grozy.** [Winter thunderstorms.] *Priroda*, Moscow, 45(2):126, Feb. **1956. DLC**—Winter thunderstorms occurred on Feb. 19, 1955 at Usmani in the Lipetsk Oblast, and at Voronezh—a rare phenomenon in the Central Chernozem region of the U.S.S.R. Synoptic conditions over Central Russia on 16–19 Feb. are summarized briefly—cold air (−7° to −18°C) at first, replaced in a warm sector by deep moist air and surface temperatures 4° to 8°C, steep lapse rates and sharp fronts plus daytime heating. Lightning storm occurred at 1430 h at Usmani and at 1605 h at Voronezh. *Subject Headings:* **1. Winter thunderstorms 2. Voronezh, U.S.S.R.**—*M.R.*

9.4–137 551.515.711

§Haworth, C. and Houseman, J., **Anticyclogenesis in relation to a particular thickness pattern.** *Meteorological Magazine*, London, 86(1025):321–332, Nov. **1957.** 17 figs., 8 refs. **DWB**—In the area between trough and ridge in 1000–500 mb layer there is a region of anticyclonic tendency on both warm and cold sides—the A-A region. Conditions for development are set out. To produce a surface anticyclone, advection must maintain the pattern for about 24 hrs. An anticyclone will develop in a weak thermal field, become warm and anticyclonic and often settled. Conditions for destruction of pattern are described. Effect of Coriolis term is to reduce anticyclogenesis when A-A thickness lines run N-S, and increase it when they run S-N. Practical applications to forecasting are set out, with characteristic of development of anticyclones and examples (1000 mb contours and 1000–500 mb thickness lines). *Subject Heading:* **1. Anticyclogenesis.**—*C.E.P.B.*

9.4–138 551.515.8(548):551.553.8

*Ramakrishnan, K. P. (*Met. Off., Poona*), **Squalls at Cochin.** *Indian Journal of Meteorology and Geophysics*, Delhi, 8(3):289–295, July **1957.** 8 figs., 9 tables, 2 refs. **DWB, DLC**—Frequency, time of day, duration, maximum speed and direction of movement of squalls at Cochin (9°57′N, 76°16′E) are analyzed for the 10 years 1943–52, from anemograph records maintained 2 miles from the Cochin aerodrome. No barograph or thermograph records were available at the site. Squalls occur about 46 days a year, 32 of them in the SW monsoon period (June–Aug.). In the premonsoon (March–May) season most squalls are associated with thunderstorms (in the monsoon season only a few are). As many as 7 distinct squalls have occurred on a single day, at least half occur in the 12 h–21 h period, and 73% come from W or NW. Most (60–65%) last <1 hour, 85% reach >40 mph, but none >60 mph. Data are tabulated in detail. *Subject Headings:* **1. Squall frequencies 2. Cochin, India.**—*M.R.*

9.4–139 551.515.8:551.578.7

Reya, O. (*Inst. of Met., Ljubljana, Yugoslavia*), **Invasion de front froid dans les Alpes sudorientales.** [Cold-front invasion in the southeastern Alps.] *La Météorologie*, Paris, Ser. 4, No. 45/46:245–250, Jan./June **1957.** 7 figs., 2 photos, table. French, English and German summaries, p. 245. **DWB**—On May 19th, 1955, at 6 a.m. a catastrophic hail-storm completely destroyed (100 percent) the vineyards of the Gorician hills, which are situated at the foot of the south-eastern Alps to the north of the gulf of Trieste. This hail-storm was associated with an invasion of a cold front. The author deals with this case and comes to the conclusion that the Alps prevented the cold front from advancing too fast, but the cold air aloft advanced more quickly. On arriving over the region of the above-mentioned vineyards, the upper cold air caused a labilisation which led to a catastrophic storm. *Subject Headings:* **1. Cold fronts 2. Hailstorms 3. Hail damage to vineyards 4. Alps.**—*Author's abstract.*

RADIATION AND TEMPERATURE

RADIATION

See also: **Sunshine duration measurement** (Riblet), 9.4–89; **Radiation and temp. measurement** (Band), 9.4–90; **Radiation measurements, Greenland Ice Cap** (Diamond, Gerdel), 9.4–141; **Radiation measurements and illumination** (Gt. Brit. Met. Off.), 9.4–141; **Snow melt runoff, Lake Constance** (Gasser), 9.4–222; **Radiation measurements during eclipse** (Minnis), 9.4–254; **Aurora and night airglow** (Lange-Hesse), 9.4–276.

9.4–140 551.521:551.311.12

Dirmhirn, Inge (*Meteorologist, Vienna, Austria*), **Über neue Strahlungsmessungen auf den Ostalpengletschern.** [Recent radiation measurements on the glaciers of the Eastern Alps.] *La Météorologie*, Paris, Ser. 4, No. 45/46:345–351, Jan./June **1957.** 4 figs., 4 tables, eq. German, French and English summaries, p. 345. **DWB**—The radiation-balance at the surface of a glacier is essentially influenced by the albedo. In deriving the amount of radiation-balance, the day has to be considered. The albedo of a glacier is composed of radiation reflected from the surface and of light coming from layers some distance below the surface. The latter part, called "Unterlicht," was measured by means of selenium cells of different sizes. In this way it is possible to eliminate errors which are caused by sheltering of the instruments. The downward and upward radiation in ice and firn was measured with equipments especially designed for this purpose (small selenium cell with Schott-filters and white-and-black-pyranometer). This radiation shows a distinct spectral modification having passed only small layers of ice and firn. Since an essential part of the albedo is caused by the "Unterlicht" it also shows a spectral characteristic. Therefore measurements of the albedo carried out with selenium cells and with pyranometers will show different results. Measurements of the radiation-balance made within snow and ice demonstrate two marked differences compared with those made at the surface: 1) the radiation-balance within the medium exists of short-wave-radiation only and 2) the radiation-balance within ice and snow cannot become negative because of the lack of long-wave-radiation. For that reason the radiation-balance can be found during certain hours in the morning and the evening, negative at the surface and positive in the upper layers of snow and ice. These facts are important for metamorphosis within the medium and for influence of the measurements of ablation by means of bore-holes. *Subject Headings:* **1. Radiation balance on glaciers 2. Albedo of glaciers 3. Eastern Alps.**—*Author's abstract.*

9.4–141 551.521.1:551.521.18

*Diamond, Marvin and Gerdel, R. W., **Radiation measurements on the Greenland Ice Cap.** *U. S. Snow, Ice and Permafrost Research Establishment, Research Report*, No. 19, Oct. **1956.** 20 p. 19 figs., 10 tables, 9 refs.—Global and long-wave radiation measurements were made on the Greenland Ice Cap, at Site 2, during the summer of 1955. It was found that only 15% of the total incident global radiation was absorbed by the snow during the 33-day period of these studies and that most of the absorbed global radiation was re-emitted as long-wave radiation. The net heat gain in late July was 7.6 ly/day, which is less than 5% of the

daily heat gain by a spring snow cover in the mountains of California. Atmospheric phenomena and the physical conditions of the snow surface which influence the amount of global radiation received at and reflected from the snow surface and the instrumental problems involved in obtaining precise data are discussed in this report. *Subject Headings:* **1. Radiation measurements 2. Infrared radiation 3. Absorption by snow pack 4. Greenland Ice Cap.**—*M.R.*

9.4–142 551.521.1:551.588.2

Kondrat'ev, K. Ia. and Manolova, M. P., **K voprosu o prikhode rasseiannoĭ i summarnoĭ radiatsii na poverkhnost' sklona.** [The problem of incoming diffuse and total radiation on the surface of a slope.] *Meteorologiia i Gidrologiia*, Leningrad, No. 6:31–34, Nov./Dec. **1955.** 3 figs., 2 tables, ref., eq. **DWB, DLC**—The radiational balance of nonhorizontal plane surfaces is analyzed quantitatively. The procedure developed involves the use of data on the angular distribution of the intensity of diffuse radiation for calculating incoming radiation on surfaces of any orientation and the elimination of albedo by the rate of incoming diffuse (or total) radiation on the inclined surface to that on a horizontal surface. The formula for calculating incoming diffuse radiation, D_c, on a slope for a given distribution of intensity of diffuse radiation $I_D\ (h_1\phi)$ is

$$D_c = \int_0^{2\pi} d\phi \int_{h(\phi)}^{\pi/2} I_D\ (h_1\phi) \cos i \cos h\, dh,$$

where $h_1\phi$=angular elevation and azimuth, i=angle of incidence of radiation upon the slope and $\cos i = \sin \alpha \cos \phi \cos h + \cos \alpha \sin h$ (α—angle of inclination of slope). Determinations of D_c/D_r (D_r=diffuse radiation upon a horizontal surface) for clear covered sky are given in tables and the application of this procedure is illustrated. *Subject Headings:* **1. Radiation on oriented slopes 2. Diffuse radiation.**—*I.L.D.*

9.4–143 551.521.12(41/2) 551.521.16(421)

Great Britain. Meteorological Office, **Daily values of radiation (milliwatt hours per cm²) and illumination (kilolux hours) at stations in Great Britain for the month of January, 1956.** London, **1956.** 2 tables, mimeographed sheet. Daily values and monthly means of total and direct radiation are given for Eskdalemuir, Kew and Lerwick, and of illumination with a recording photometer at Kew and Kingsway (London). *Subject Headings:* **1. Radiation measurements 2. Daylight illumination measurements 3. Great Britain 4. London, Eng.**—*C.E P.B.*

9.4–144 551.521.12(922):551.506

*Reesinck, J. J. M., **Pyrheliometric measurements in Indonesia.** *Indonesia. Lembaga Meteorologi dan Geofisik, Djakarta, Verhandelingen*, No. 48:1–16, **1956.** 7 figs., 7 refs., 7 tables. **DLC** (QC802.I5A32), **DWB**—Measurements made at Bandung (Sept. 1951 to Dec. 1955), Djakarta (March 1951–Aug. 1955) and Kupang (March 1951 to May 1952) in Indonesia with Moll-Gorczyński pyrheliometers using 4 color filters (dark red, red, yellow and blue) at fixed hours (9, 12 and 15h at Kupang, and at 9, 10:30, 12, 13:30 and 15H at Djakarta if sun was visible) and as often as possible when sky was clear near sun. Hourly and seasonal variations in several parameters associated with these measurements are presented in graphical and tabular form. Transmission factor (T), pyrheliometer readings without filters (0) are two of the factors analyzed and compared. *Subject Headings:* **1. Pyrheliometer measurements 2. Spectral radiation data 3. Indonesia.**—*M.R.*

9.4–145 551.521.12

*Shul'gin, A. M., **Solnechnaia radiatsiia v razlichnom travostoe.** [Solar radiation in various grass stands.] *Meteorologiia i Gidrologiia*, Leningrad, No. 2:32–34, Feb. **1956.** 5 tables, 2 refs. **DWB, DLC**—The role of solar radiation in plant growth was studied by measuring the total solar radiation of the environment, primarily on clear days, by means of a IAnichevskiĭ pyranometer. Data are presented on the total solar radiation at a height of 160 cm above a grass stand and among plants at a height of 16 cm and 10 cm above the soil at noon, total solar radiation in sowings of spring wheat and barley 10 cm above the soil in a

homogeneous nutritive environment but differently distributed, etc. *Subject Headings:* **1. Solar radiation in grass stands 2. Pyranometers.**—*I.L.D.*

9.4–146 551.521.16(431)

Wörner, H., **Der Jahresgang der Tageshelligkeit und seine Beeinflussung durch die Witterungsverhältnisse.** [The annual variation of daylight illumination and its influence by weather conditions.] *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. B,* 8(2):202–214, **1957.** 4 figs., 5 tables, 2 refs. German, English and French summaries p. 202–203. **DWB**—Variations of astronomical daylight at Berlin and Potsdam (5000 and 7000 lux morning and evening) in cloudless weather and mean turbidity are tabulated. Observed mean limits of 7000 lux morning and evening at Potsdam and Berlin (Rummelsburg) are set out for comparison. The shorter days and greater cloudiness in winter decrease length of day by 60–70% in the city and 40–50% in the country. In Dec. on 27% of days at Potsdam and 46% at Rummelsburg daylight did not reach 7000 lux. *Subject Headings:* **1. Daylight duration 2. Germany.**—*C.E.P.B.*

9.4–147 551.521.3

Albrecht, Fritz H. W., **Die Berechnung der Angströmschen Trübungskonstanten aus Sonnenstrahlungsmessungen in verschiedenen Filtergebieten.** [Calculation of the Ångström's turbidity constants from solar radiation measurements in different spectral regions.] *Geofisica Pura e Applicata,* Milan, 33:229–244, **1956.** 7 figs., 3 tables, 14 refs., 20 eqs. English and German summaries p. 229. **DLC**—In order to determine the Ångström's turbidity constant from several hundred measurements of direct solar radiation with five different glass filters, the author calculated Ångström's formulas for 144 different values of air masses, wave length experiments of the scattering function, the turbidity coefficient and water vapor content of the atmosphere. It was found that the differences belonging to the spectral ranges, blue, yellow, red and infrared can be expressed by simple algebraic functions. A new form for expressing the water vapor absorption was developed. Also new equations were derived enabling the determination of the wave length exponent in the long wave range of solar radiation where water vapor absorption exists. *Subject Headings:* **1. Ångström's turbidity constants 2. Solar radiation measurements 3. Absorption by water vapor.**—*Based on author's abstract (I.L.D.).*

9.4–148 551.521.3

Curcio, J. A.; Knestrick, G. L. and Drummeter, L. F., **A preliminary study on the correlation of atmospheric transmission with back-scattering.** *U. S. Naval Research Laboratory, NRL Report* 4818, Aug. 28, **1956.** 19 p. 15 figs., 2 tables, 5 refs., eqs. **DWB**—The relative back-scattered flux from an ultraviolet light pulse has been measured at night under various atmospheric conditions including clear weather, fog, drizzle, and snow. For each of the measurements, the transmission of one thousand feet of atmosphere was measured at a wavelength of 6650 Å with the aid of a telephotometer which consisted of a modified commercial optical pyrometer. The measurements show a correlation between the relative back-scattered signal and the transmission. The signal decreased with increasing transmission and changed by a factor of fifteen as the transmission varied from 10 percent to 98 percent per thousand feet. *Subject Headings:* **1. Atmospheric-light transmission 2. Atmospheric scattering.**—*Authors' abstract.*

9.4–149 551.521.64

Dorman, L. I.; Kaminer, N. S.; Koiava, V. K. and Shvartsmian, B. F., **Bol'shaia vspyshka intensivnosti kosmicheskikh luchei 23 fevralia 1956 g. po nabliudeniiam v Moskve, Sverdlovske, Tbilisi i na myse Shmidta.** [A large outburst in cosmic ray intensity on Feb. 23, 1956, as observed at Moscow, Sverdlovsk, Tiflis and Cape Schmidt.] *Akademiia Nauk SSSR, Doklady,* 108(5):809–812, June 11, **1956.** fig. (graphs), table, 7 refs. **DLC**—The recordings of cosmic radiation intensity on Feb. 23, 1956 as recorded at widely separated localities within the U.S.S.R. are presented in a table and by means of graphs and they are described and compared. These outbursts are considerably greater than those observed on 19 Dec. 1949. It is concluded that the great outburst of cosmic radiation was produced by an additional current

of positively charged particles from the sun containing particles with energy exceeding 5 Bev but not greater than 10–15 Bev. *Subject Headings:* **1. Cosmic ray intensity 2. Cosmic ray outbursts 3. U.S.S.R.**—*I.L.D.*

9.4–150 551.521.67:550.38

Pecker, Jean-Claude and Roberts, Walter Orr (*High Altitude Obs., Boulder, Colo.*), **Solar corpuscles responsible for geomagnetic disturbances.** *Journal of Geophysical Research*, 60(1):33–44, March **1955.** 6 figs., 16 refs. **DWB**—A qualitative hypothesis is given that attributes recurrent "*M*-region" geomagnetic disturbances to the arrival at the earth of solar corpuscles that have been gathered into beams by the deflecting action of coronal-region fields, presumably magnetic, associated with centers of heightened solar activity. The hypothesis identifies the source of solar corpuscles that produces *M*-region magnetic disturbances with "quiet areas" of the solar surface. A related hypothesis associates non-recurrent magnetic storms, the greatest ones, with a different solar corpuscular source, found in the active region itself. *Subject Headings:* **1. Corpuscular radiation 2. Geomagnetic disturbances.**—*Authors' abstract.*

TEMPERATURE

See also: **Temp. distribution in forests** (Baumgartner), 9.4–55; **Radiation and temp. measurement** (Band), 9.4–90; **Min. temp. forecasting** (Sinha), 9.4–107; **Soil-air heat exchange** (Berliand), 9.4–122; **Temp. gradient-instability relationships, Austrian Alps** (Hoinkes), 9.4–155; **Zero pressure change, European Russia** (Kashin, Gritsenko), 9.4–163; **Evaporation-precip.-temp. relationships, Alps** (Reichel), 9.4–176; **Radiation fog and temp. inversions** (Urfer), 9.4–180; **Snow density and atmospheric temp.** (Bossolasco, Dagnino), 9.4–211; **Indoor temps.** (Radulov, Ambrus), 9.4–243.

9.4–151 551.524.2:551.578.46:551.525.2

Berg, H. (*Inst. of Met. Univ. of Cologne*), **Temperaturmessungen in der schneenahen Luftschicht.** [Atmospheric temperature measurements near the snow surface.] *La Météorologie*, Paris, Ser. 4, No. 45/46:357–361, Jan./June **1957.** 6 figs., tables, 2 refs. German, French and English summaries p. 357. **DWB**—Measurements of temperature above the surface of snow with special needle-shaped thermoelements apparently give good results. Even single series of measurements give a straight line down to 1 mm on semilogarithmic paper (temperature linear, height logarithmic). Between 1 mm and the surface of the snow temperature-differences of 6°C are possible. The inclination of the line has only little connection to the differences of temperature between 50 cm and the surface and to the wind-velocity. The variation of temperature has its maximum around 1 cm. *Subject Heading:* **1. Temperature measurement over snow surface.**—*Author's abstract.*

9.4–152 551.524.36(71)

*Boughner, C. C., **Degree-day data for selected Canadian Stations.** *Canada. Meteorological Div., CIR*-2830, CLI-14, Oct. 16, **1956.** 16 p. 2 refs. mostly tables. **DLC, DWB**—Data for forty-six Canadian stations for the 10 year period 1946/7 to 1955/6 are presented in 2 forms: 1) average monthly values for the 10 years, Sept. to Aug., and 2) actual monthly values for each month and year during the 10 year period. Average of daily maximum and minimum temperature is used in determining mean daily temperature and 65°F. is used as the basis. *Subject Headings:* **1. Degree day data 2. Canada.**—*M.R.*

9.4–153 551.524.37:634.94

Daubenmire, R. (*State Col. of Wash., Pullman*), **Injury to plants from rapidly dropping temperature in Washington and Northern Idaho.** *Journal of Forestry*, Wash., D. C., 55(8): 581–585, Aug. **1957.** 3 figs., 13 refs. **DWB**—Three severe cold waves that did extensive damage to vegetation in Washington and Northern Idaho are described and analyzed graphically. The freeze of Dec. 1924 is not too well documented, but diurnal temperature ranges in N. Idaho and Western Washington are shown graphically. Similar cold waves on Oct. 23–Nov. 6, 1935 and Nov. 6–20, 1955 are treated—in the latter case with extensive notes on damage to specific varieties in the east and west portion of the region. Damage first assessed

at $11 million was later revised to $66 million. Most young exotic, and, in Western Washington, many native species were killed. Fast growing, heavy fertilized, marginal, southerly exposure, unprotected by taller trees or snow, were damaged more than slow growing and protected trees or shrubs. Theories as to genetic differences between east side and west side trees were tested and resolved. Those from the interior are hardier. Finally it is concluded that low temperature extremes, even when lasting several days, do not determine the ranges or limits of growth of native plants. *Subject Headings:* **1. Cold waves, Pacific Northwest 2. Freezing effects on trees 3. Washington 4. N. Idaho.**—*M.R.*

9.4–154 551.524.37:551.579.5

Wilner, J. (*Agri. Res. Officer, Indian Head, Saskatchewan, Canada*), **Effect of low temperatures on available soil moisture during winters on the Canadian prairies.** *Agronomy Journal*, Madison, Wisc., 47(9):411–413, Sept. **1955.** 2 tables, 12 refs. **DLC**—The effect of winter temperatures on the available moisture in the upper 12 to 18 inches of the soil and on aerial parts of woody plants grown on the Canadian prairies is discussed. Soil moisture was determined by the plaster of paris electrical resistance method of Bouyoucos. It was found that the availability of soil moisture during the winters of 1952–1953 and 1953–1954 decreased with intensity and duration of low atmospheric temperatures. The frozen soil moisture to a depth of 12 to 18 inches was not available to plants for about 2½ months although during this period there were many days with air temperatures about 32°F and as high as 41°F. *Subject Headings:* **1. Low temperature effects on soil moisture 2. Soil moisture measurement 3. Canadian prairies.**—*I.L.D.*

9.4–155 551.524.4:551.524.1:551.584.34

Hoinkes, Herfried, **Über den Zusammenhang zwischen Temperaturgradient und Temperaturunruhe.** [Relationship between temperature gradient and temperature instability.] *Germany. Deutscher Wetterdienst, Berichte*, 4(22):16–18, **1956.** 3 figs., 4 refs., eqs. **DWB, DLC**—This study of the relationship between temperature gradient and irregular turbulent temperature oscillations was carried out in the summer on the Hintereisferner in the Ötztaler Alps (Austria) by using individual thermal elements situated on a mast at the height of 1, 7, 14, 30 and 100 cm above the snow or ice surface. The temperature oscillations obtained at the five altitudes are expressed by equation

$$T = \frac{\text{const } k^{\frac{1}{2}}}{Z+Z_0}.$$

The relationship is clearest above 14 cm; but the values are somewhat scattered below 7 cm. The dependence of the mixing path for heat transfer upon height is expressed by $I_w = \text{const } Z^{1.23}$ for 1 cm $< Z <$ 103 cm. Since $k^{\frac{1}{2}}/(Z+Z_0)$ diminishes in an unevenly proportional ratio to altitude, $T' = \text{const } Z^{0.25}$. *Subject Headings:* **1. Temperature gradient-instability relationships 2. Temperature oscillations 3. Hintereisferner (glacier).**—*I.L.D.*

9.4–156 551.524.4

Milosavljevic, M. and Milosavljevic, K. (*both, Univ. of Belgrade, Yugoslavia*), **Gradients et inversions des témperatures de l'air dans quelques montagnes de la République Populaire de Serbie.** [Atmospheric temperature gradients and inversions in some mountains of Serbia.] *La Météorologie*, Paris, Ser. 4, No. 45/46:257–266, Jan./June **1957.** 3 figs., 9 tables, 2 refs. French, English and German summaries, p. 257. **DWB**—For the study of the variation of the air temperature with the change of the height, three mountain regions from the People's Republic of Serbia were chosen. In each of these regions exists a meteorological mountain station (above 1000 m), and around it meteorological stations at lower heights. The investigation consists of two parts. The first one treats the general variation of the air temperature with the height, while in the second part there are analyses of temperature data during the temperature inversions. The meteorological data are referred to the period from 1950 to 1953 (June). *Subject Headings:* **1. Temperature gradient 2. Temperature inversions 3. Serbia, Yugoslavia.**—*Authors' abstract.*

9.4–157 551.524.4:551.515.3

Ward, Neil B. (*U. S. W. B. R. O., Fort Worth, Tex.*), **Temperature inversion as a factor in formation of tornadoes.** *American Meteorological Society, Bulletin*, 37(4):141–151, April **1956.** 13 figs. (incl. photos), 5 refs. **DWB**—A model is presented to show a possible mechanism whereby an inversion above a thunderstorm could restrict the column of rising air to the point where a tornado funnel would be formed in the convective column below, due to horizontal convergence. A laboratory model was constructed, using air instead of water as has been done previously. Ten photos show the various forms the rising column of injected smoke takes when the size of the upper diaphragm is varied, or the speed of rotation (by means of an array of vertical fins on a rotating carrier) varied. The temperature at the upper (exhausting) surface was kept 15°F above room temperature. Many features of tornadoes appear in the model. (*Same item as* 7F–216, June 1956, *MAB.*) *Subject Headings:* **1. Tornado models 2. Inversion effects on tornado formation.**—*M.R.*

SOIL TEMPERATURE

See also: **Soil-air heat exchange** (Berliand), 9.4–122.

9.4–158 551.525:551.579.5

†Blanc, Milton L. (*Office of Climatology, U. S. Weather Bureau*), **On the relationship of soil temperatures to soil moisture measurements.** *World Meteorological Organization. Commission for Climatology, 2nd, Wash., D. C., Jan. 1957, Papers, CCl*-II/Doc. 42, Dec. 10, **1956.** 15 p. tables, 32 refs. **DWB** (M06W927cm CCl:1957)—A review of the physical and biological effects of soil temperature, with some special emphasis on the relationship to soil moisture, indicates that this is an important and appropriate field of inquiry for the climatologist. There is a serious lack of uniformity or standardization in methods of observation. This lack extends to instrumentation, exposure, and depth and frequency of observation. The suggestions and literature references in this paper are given to provide a basis for a discussion of the problem by members of the Commission for Climatology. *Subject Headings:* **1. Soil temperature-soil moisture relationships 2. Soil temperature measurement.**—*Author's abstract.*

9.4–159 551.525:551.578.46

Gutman, L. N. and Doroganevskaia, M. A., **O raschete temperatury pochvy, pokrytoĭ snegom.** [Calculation of the temperature of the soil under snow.] *Akadamiia Nauk SSSR, Izvestiia, Seria Geofiz.*, No. 10:1188–1199, **1956.** 3 figs., tables, 6 refs., 39 eqs. **DLC**—Formulas are developed for calculating the mean daily temperature of the soil (at different depths) under snow cover from the air temperature or measured in the usual instrument shelter. In contrast to other studies of this problem the present formulas take into account the variation with time of such factors as thickness of the snow cover, coefficients of temperature conduction and heat conduction of snow and also the coefficient of turbulence of the air layer over the snow. Specific numerical calculations are presented. *Subject Headings:* **1. Soil temperature under snow 2. Soil temperature calculations.**—*Trans. of authors' abstract.*

WATER TEMPERATURE

See also: **Climatic changes and deep-sea sediments** (Ericson et al.), 9.4–239.

9.4–160 551.526.8

Eckel, O. (*Institut de Met. Vienna, Austria*), **Die Bedeutung der Springschicht für den Wärmehaushalt der Alpenseen.** [Importance of the discontinuity layer for the heat balance of Alpine Lakes.] *La Météorologie*, Paris, Ser. 4, No. 45/46:339–344, Jan./June **1957.** 5 figs. German, French and English summaries, p. 339. **DWB**—From voluminous observation material, three types of lakes can be distinguished in the Eastern Alps during the summer months, based on their thermal stratification. Lakes with a pronounced discontinuity layer accumulate in general more heat than those with a less developed or mixing discontinuity layer. Exceptions are pointed out. The vertical layers, and finally the heat proportion of the epilimnion in relation to the total heat content of the lake are discussed. *Subject Headings:* **1. Heat balance of lakes 2. Lake discontinuity layer 3. Alpine lakes.**—*Author's abstract.*

PRESSURE AND WIND

PRESSURE

See also: **Monthly mean pressure charts, Canada** (Potter), 9.4–17; **Upper air pressure-ozone amount relationships** (Kawamura), 9.4–118.

9.4–161 551.541:551.558.21

Bérenger, M. and Gerbier, N., **Les mouvements ondulatoires à Saint-Auban-sur-Durance (Basses-Alpes).** [Lee waves at Saint-Auban-sur-Durance (Basses-Alpes).] *La Météorologie*, Paris, Ser. 4, No. 45/46:273–278, Jan./June **1957.** 4 figs. French, English and German summaries, p. 273. **DWB**—The lee waves due to the mountains were experimentally studied in January 1956 at Saint-Auban-sur-Durance. The first conclusions are given: vertical distribution of the wind, wave length and amplitude of the waves, distribution of the temperature, turbulence, clouds. . . . The importance of these waves for gliders and aircraft is pointed out. *Subject Headings:* **1. Lee waves 2. Gliding 3. Saint-Auban-sur-Durance, France.**—*Authors' abstract.*

9.4–162 551.542.1

Bouët, Max, **Les Alpes dans le champ de pression.** [The Alps in the pressure field.] *La Météorologie*, Paris, Ser. 4, No. 45/46:279–282, Jan./June **1957.** fig., table, 3 refs., eq. French, English and German summaries, p. 279. **DWB**—The average difference in pressure between the two slopes of the Swiss Alps (transalpine gradient) shows a dispersion twice as large as the gradient between points north or south of the Alps, and of opposite sign; it varies with the temperature of the middle layers of the atmosphere. *Subject Headings:* **1. Transalpine pressure gradient 2. Swiss Alps.**—*Author's abstract.*

9.4–163 551.543:551.524.3

Kashin, K. I. and M. V. Gritsenko, **Poverkhnost' nulevykh izmeneniĭ davleniia.** [Surface of zero pressure change.] *Meteorologiia i Gidrologiia*, Moscow, No. 8:9–13, Aug. **1956.** fig., 4 tables, ref., 2 eqs. **DWB, DLC**—With the aid of the formula describing pressure change at the earth's surface with temperature, on the assumption of the existence of surface of zero pressure change, it is shown that the pressure at the earth's surface varies with the temperature change within the column of air extending from the surface to the surface of zero pressure change, regardless of the cause of the temperature change. The relationship between the change in temperature at the earth's surface, height of the surface of zero pressure changes, and the magnitude of temperature changes were studied on the basis of data of 24 stations in the European U.S.S.R. for April 1952. The mean 24 hour temperature change was determined for the interval between the earth's surface and the surface of zero pressure change and the value was multiplied by the corresponding correlation coefficient. Data are presented on the distribution of deviations of calculated values of pressure change from the actual values, magnitude of pressure changes at the lower margin of the layer when the temperature within the layer did not vary by 1°C and distribution of the magnitude of variations in the height of the surface of zero pressure change. *Subject Headings:* **1. Zero pressure change 2. Temperature changes 3. Pressure-temperature correlations 4. European U.S.S.R.**—*I.L.D.*

WIND

See: **Wind tunnel experiments** (Sanuki), 9.4–91.

GUSTINESS AND TURBULENCE

See: **Turbulent diffusivity** (Elnesr), 9.4–124.

HORIZONTAL DISTRIBUTION AND WIND VARIATIONS

See also: **Squall frequencies, India** (Ramakrishnan), 9.4–138.

9.4–164 551.552:551.515.8

§Newton, Chester W., **Observational studies of squall line behaviour, and effects of environmental wind field.** Chicago Univ. Dept. of Meteorology, Contract Cwb 8613,

Technical Report (unnumbered), Nov. **1956.** 72 p. 9 figs., 14 refs., 5 eqs. This is bound in its **Report** (unnumbered), Aug. 1, 1955–June 30, 1956. Issued Feb. **1957. DWB** (M15 C532s)—Three thunderstorm situations are investigated synoptically and dynamically to determine the effect of the shear and other wind field parameters on development or propagation of the storms or squall lines. Large rainstorms move slower and slightly to the right of the mean winds aloft, whereas small convective storms move with the mean winds. Section II is an abridgement of a study by Lt. Seymour Katz, of the development and movement of 2 rainstorms in the Mississippi Valley in May 1954. *Subject Headings:* **1. Wind field effects on squall lines 2. Precipitation pattern propagation 3. Mississippi Valley.**—*M.R.*

9.4–165 551.553.12

Maletzke, R. (*Deutsche Forschungsanstalt für Segelflug, Munich*), **Neue Ergebnisse über die Entwicklung des Taleinwindes.** [New results on the development of the valley breeze.] *La Météorologie*, Paris, Ser. 4, No. 45/46:267–271, Jan./June **1957.** 7 figs. German, French and English summaries, p. 267. **DWB**—Air flow measurements by means of pilot-balloons have been made in the Ache valley in Tyrol; these were made simultaneously inside and outside the Alps valleys. The graph of the vertical speeds only show that a reciprocal influence between the up-valley winds and the winds outside the valley might exist. *Subject Headings:* **1. Mountain and valley breezes 2. Ache Valley, Tyrol.**—*Author's abstract.*

9.4–166 551.553.5(712)

*Pickering, C. (*Aviation Forecast Off., Calgary, Alta*), **Frequency and variation of surface wind speeds during daylight hours at Calgary, Alberta.** *Canada. Meteorological Div., CIR-*2594, Tec-206, Jan. 10, **1955.** 3 p. 2 figs., 2 tables. **DWB, DLC**—Brief study for use in parachute jumping planning based on 12 years of surface wind speed data for Calgary Airport—1942–1953. Table gives hourly and monthly average wind speeds for 6–8 a.m. to 6–9 p.m., and another gives percent of daylight hours for each hour and month, with average wind speed >15 mph. Same data are shown on 2 charts giving isopleths of average wind speed for 1 mph intervals and percent of winds >15 mph for 5% (5%–40%) intervals. *Subject Headings:* **1. Wind speed frequencies 2. Surface wind variations 3. Calgary, Alberta.**—*M.R.*

9.4–167 551.553.6:519.241.2

Kojima, T., **Relationship between the various annual mean wind velocities and the frequency distribution of wind velocities.** *Journal of Meteorological Research*, Tokyo, 9(8):596–599, Aug. **1957.** 3 figs., 3 eqs. **DWB**—This paper describes a method to estimate the frequency distribution of wind velocities for the various annual mean velocities. At first, a statistical relationship between the annual mean wind velocity ($\bar{v}$:m/s) and the standard deviation (σ) is derived as,

$$\sigma = 0.5\bar{v} + 0.6.$$

Next, it is assumed through our experience that the frequency distribution may be fitted to Γ-distribution. By using the annual mean wind velocity ($\bar{v}$) and the standard deviation (σ) the parameters in Γ-distribution are calculated for some stations. The frequency distributions thus obtained generally fit the observed values with an exception for stations on islands. *Subject Headings:* **1. Wind velocity frequency distribution 2. Annual mean wind velocities.**—*Author's abstract.*

SPECIAL WINDS

9.4–168 551.555.6

*Cheng, Chwen-Shu (*Nanking Observatory*), **On the occurrences of cold spells in the lower Yantze.** *Acta Meteorologica Sinica*, Peking, 26(1/20):125–134, **1955.** tables. In Chinese; English summary, p. 134. **DLC** (Orientalia)—A statistical analysis of 53 years of hourly pressure data for Shanghai to show the number of occurrences of sudden pressure rises of 3 class intervals of amplitude of pressure rise and temp. fall. Compared with singularities noted in a fisherman's almanac, the findings show major coincidence, according to the author. *Subject Headings:* **1. Cold waves 2. Pressure variations 3. Singularities 4. Lower Yangtze Basin, China.**—*From Author's abstract.*

9.4–169 551.555.6

*§McQueen, Henry R. and Loopstra, John F. (*Nat. Wea. Analysis Center, U. S. W. B., Wash., D. C.*), **Cyclogenesis and precipitation in the blizzard of March 21–26, 1957.** *Monthly Weather Review*, Wash., D. C., 85(3):99–111, March **1957.** 4 figs., 5 tables, 19 refs. **DWB, DLC**—A synoptic case history study of the intense low which moved down the east slope of the Continental Divide on March 21–26, 1957, accompanied by dust storms, blizzards and snow and heavy precipitation in some localities. All of the pertinent wind, precipitation, snow and vertical velocity data are tabulated and discussed in relation to forecasting procedures used and tested. WAGNER's and ESTOQUE's methods of precipitation forecasting are used to see what value they would be in such a case. Comparative values for observed and forecast precipitation amounts for ESTOQUE's method, and a discussion of the relations of thickness patterns to probability of snow or rain over the area (WAGNER's method) are presented. *Subject Headings:* **1. Cyclogenesis 2. Blizzard, Great Plains (March 1957) 3. Blizzard forecasting 4. Great Plains.**—*M.R.*

WIND EFFECTS

See: **Wind effects on snow gages** (Warnick), 9.5–15; **Wind effects on vasomotor reflexes** (Kamiyama), 9.4–63; **Wind effects on precip. measurement** (Grunow), 9.4–93; **Wind effects on precip. measurement** (Vanni), 9.4–97; **Hurricane generated sea waves** (Rosenblatt), 9.4–134; **Tornado damage patterns** (Reynolds), 9.4–135; **Upper air wind data, Poona** (Ramakrishnan et al.), 9.4–170.

UPPER AIR WINDS

See also: **Upper air wind data, Angola,** 9.4–77; **Tropopause-jet stream-rainfall relationships** (Badner, Johnson), 9.4–117; **Subtropical jet stream and convection** (Desai), 9.4–127.

9.4–170 551.557:551.558:551.508.56(547)

*Ramakrishnan, K. P.; Parthasarathi, S. and Aphale, N. C. (*all, Met. Off., Poona*), **Some high pilot balloon ascents at Poona.** *Indian Journal of Meteorology and Geophysics*, Delhi, 8(3):273–288, July **1957.** 10 figs., 6 tables, 6 refs. **DWB, DLC**—During the winter of 1952–3, forty special pilot balloon ascents were made about twice a week at Poona, to get data on winds >60,000 ft. Six NR875 type (875 g) and 34 NR575 balloons were used. Of these 16 reached 60,000 ft. On 4 days, 2 independent runs were made ½ hr apart. Tails 200 m long were attached to the balloon and a soundbag and 3′×5′ flag tied to the end of the tail for stability and accuracy. Greatest height reached was 22.0 km compared with 16.3 km for the ordinary pilot balloon run. A table shows frequency of heights in km class intervals from <10 to >20 km for special and for routine runs. Weighting of tail reduced inaccuracy due to slanting of tail. Double runs showed accuracy within 20° and 5 knots. Height-time curves are given for pairs of ascents and vertical current data on scattergram and in tables. A graphical analysis is also made of the day to day wind patterns from 0 to 22 km for each month, and important features are discussed in relation to synoptic situations. Vertical curves of 5 or even 10 km/hr were noted at Poona during winter—mainly downward below 3 km and above 18 km, and upward between 4 and 18 km. At beginning of season (Nov.) winds in lower stratosphere were easterly. Later they remained westerly until end of season. Maximum speed of westerlies occurred at or <14 km, except for one spell when the maximum occurred at 21 km (followed by development of a severe cyclonic storm). *Subject Headings:* **1. Upper air wind data 2. High level winds 3. Vertical currents 4. Pilot balloon observations 5. Poona, India.**—*M.R.*

9.4–171 551.557:551.510.535

Rao, B. Ramachandra; Rao, M. Srirama and Murthy, D. Santyanarayana (*all, Ionosphere Lab., Andhra Univ., Waltair*), **Investigation of winds in the ionosphere by spaced receiver method.** *Journal of Scientific and Industrial Research, Sec. A*, New Delhi, 15(2):75–81, Feb. **1956.** 4 figs., 13 refs., 6 eqs. **DWB, DLC**—Details of equipment and results of soundings presented in text and illustrations (recorder records), polar diagrams showing seasonal variation

of wind movements in the E and F region in winter from NE and summer (W in E layer, indef. in F); wiring diagrams, etc. based on spaced receiver observations (Mitra, 1949), made at the Ionospheric Laboratory at Andhra Univ., Waltair, India, in 1954 using 3 receiving antennas and one pulse sender operating in the 2–6 Mc/sec range with a pulse width of 200 microseconds. *Subject Headings:* **1. Ionospheric winds 2. Spaced receiver method 3. Waltair, India.**—*M.R.*

9.4–172 551.557.5:551.513.1:608.4

†Fultz, Dave (*Univ. of Chicago*), **A survey of certain thermally and mechanically driven systems of meteorological interest.** *U. S. Office of Naval Research, Proceedings of the First Symposium on the use of Models in Geophysical Fluid Dynamics, Sept. 1953*, pub. **1956.** p. 27–63. 35 figs. (incl. photos), 33 refs., 7 eqs. **DWB, DLC**—This is the most comprehensive and elaborate presentation in the published literature on the Rotating Dishpan Experiments of Dave Fultz. Theory, experimental equipment and techniques, historical models of a similar nature (Vettin, 1884) showing trade (Hadley) or symmetric regime, and later quasi-geostrophic (Rossby) regime as shown by streaks in author's photographs of his experiments, plus numerous ingenious experiments to determine or demonstrate critical limits for the two types of flow, and to make other quantitative estimates of conditions during various regimes (convection or quasi-Benard, two-liquid front or inversion systems, Taylor-type highly geostrophic motions, etc.). Limitations and suggestions for overcoming inconsistencies are outlined. *Subject Heading:* **1. Rotating dishpan models.**—*M.R.*

VERTICAL MOTION

See: **Lee waves, Saint-Auban-sur-Durance** (Berenger, Gerbier), 9.4–161.

AQUEOUS VAPOR, HYDROMETEORS AND HYDROMETEOROLOGY

HUMIDITY

See also: **Tropospheric humidity** (Dobryshman), 9.4–116; **Irrigation effects on humidity, Arizona** (Ohman), 9.4–173.

9.4–173 631.67:551.571

Ohman, Howard L. (*Geographer, Regional Environments Research Branch*) and Pratt, Richard L. (*Biophysics Branch*), **The daytime influence of irrigation upon desert humidities.** *U. S. Quartermaster Corps. Research and Development Command. Environmental Protection Div., Technical Report*, EP-35, May **1956.** 30 p. 16 figs. (incl. photos), 3 tables, 14 refs. **DWB**—In order to determine the extent to which atmospheric humidities in the surface layer of the atmosphere are influenced by irrigation, the authors analyzed the distribution of dew point within the vicinity of the irrigated land near Yuma, Arizona during the period Aug. 3–13, 1954. Moisture characteristics of the air before and after passage over irrigated field, humidity distribution in crop lands, and the variation in humidity over a distance of 20 miles extending from the desert south of Yuma—the All-American Canal on the north—were analyzed. It was found that (1) transpiration and evaporation causes the dew point to increase 6 to 8°F and the temperature to decrease 4 to 6°F at height of 3 ft when wind speeds are less than 10 mph within the immediate area of cultivation, (2) the effect is limited at crop height levels to about 100 feet from the moisture source when wind speeds are less than 10 mph, (3) within the irrigated land the areal distribution of crop development is a strong index to the distribution of humidity and (4) irrigation exerts a negligible influence upon atmospheric humidities in the area examined. Tables giving data and maps showing the dew point distribution in southwestern United States, dew point values at Colorado River Control Station (Yuma, Arizona) and the location of weather sites and a weather map of western U. S. for 7 Aug. 1954 are presented. *Subject Headings:* **1. Irrigation effects on humidity 2. Humidity distribution 3. Dewpoint 4. Yuma, Arizona.**—*I.L.D.*

EVAPORATION AND EVAPOTRANSPIRATION

See also: **Evaporation and soil tractionability** (Drexel Inst. of Tech.), 9.4–14.

9.4–174 551.573:551.579

Benton, George S. and Dominitz, Jack, **Measuring evapotranspiration from atmospheric data.** *American Society of Civil Engineers, Proceedings*, Vol. 82, Aug. **1956,** Paper 1035 (Journal of the Hydraulics Div.). 26 p. 9 figs., 4 tables, 13 refs., 17 eqs. **DWB**—Data from 22 radiosonde stations in the U. S., Canada and Alaska for the year 1949 were used to calculate the evapotranspiration from large and small areas (Canada, Central U. S., North-Central U. S., and Ohio River Basin), in order to compare accuracy of the author's method (*see* 6.5–205, May 1955, *MAB*) based on the balance of water vapor in the atmosphere, with results obtained by THORNTHWAITE's method or by using the hydrologic equation. It is found that the author's "atmospheric balance" equation gives excellent results for large areas of continental or subcontinental size, if long periods are used, but not so good results for smaller areas such as 4–8 states in the Midwest. Monthly values for each area are shown graphically, in comparison with THORNTHWAITE's formula, and theory presented. *Subject Headings:* **1. Evapotranspiration 2. Hydrologic balance 3. Thornthwaite's method 4. North America.**—*M.R.*

9.4–175 551.573:536.7

Garmendia Iraudegui, José, **La termomecanica de la evaporación y de la sublimación.** [Thermodynamics of evaporation and sublimation.] *Revista de Geofísica*, Madrid, 15(57): 29–34, Jan./March **1956.** 4 refs., 6 eqs. Spanish and English summaries, p. 29. **DWB**—A theoretical development of the thermodynamics of evaporation and condensation leading to the conclusion that 1) when the gas and liquid phase are not in thermal equilibrium, the difference between the free enthalpy per unit mass does not determine the evaporation and sublimation processes; 2) the variation of vapor pressure between the two phases affects the evaporation or sublimation; 3) equilibrium is established with respect to evaporation or sublimation, when the vapor pressure equals that of saturation at the liquid phase; 4) the difference of the logarithms of the vapor pressures determines the tendency of the evaporation. *Subject Headings:* **1. Thermodynamics of evaporation 2. Evaporation and sublimation.**—*M.R.*

9.4–176 551.573:551.577:551.524

Reichel, E. (*Munich*), **Der Zusammenhang zwischen Niederschlag, Temperatur und Verdunstung in den Alpen.** [Relation between precipitation, temperature, and evaporation in the Alps.] *La Météorologie*, Paris, Ser. 4, No. 45/46:199–205, Jan./June **1957.** tables, 8 refs. German, French and English summaries p. 199. **DWB**—Evaporation is considered—according to WUNDT's process—as depending upon precipitation and temperature. In the Alps not very homogeneous precipitation and streamflow values give an uncertain basis for the evaporation which is their difference. However, it is possible to demonstrate that evaporation in the Alps is 80 to 130 mm higher than the global average for the same yearly precipitation and temperature values. It is assumed that the most important reason for that is the accumulation of snow. The "foehn" and meadow irrigation might also play a part. In conclusion, an evaporation of 600 to 700 mm at 600 meters and of 550 to 650 mm at 1000 meters altitude is found in the Alps, provided that sufficient precipitations (over 1175 mm, respectively, 1050 mm) are available. *Subject Headings:* **1. Evaporation-precipitation-temperature relationships 2. Alps.**—*Author's abstract.*

9.4–177 551.573:551.508.72:631.67

*Robertson, George W. (*Met., Central Experimental Farm, Ottawa*), **Estimating irrigation water requirements from meteorological data.** (In: Ontario Irrigation Conference, Ontario Agricultural College, Guelph, Feb. 1956, **Proceedings,** pub. April **1956.** p. 1–7. 2 tables, 5 refs.) Also Robertson, George W. and Holmes, R. M., **Estimating irrigation water requirements from meteorological data.** Ottawa, Experimental Farms Service, Canada. Dept. of Agriculture, **1956.** 19 p. 9 tables, 17 refs. **DA?**—The potential evapotranspiration is assumed to be proportional to the evaporation of a black Bellani plate atmometer. The available soil moisture is computed for an amount of rain, transpiration and surplus. Supple-

mental irrigation of 1" is recommended whenever the soil moisture deficit reaches 1½". A day-to-day account was made by computing machines for 24 years at Ottawa and the normal requirements are summarized. Using monthly averages, the results would be distorted. In the article by ROBERTSON and HOLMES, in addition to a general discussion of soil moisture, daily water use and evapotranspiration (with tables showing supplemental irrigation requirements for Ottawa) a daily soil moisture and irrigation budget for Ottawa for Aug. 1955 is included and discussed. *Subject Headings:* **1. Potential evapotranspiration 2. Irrigation 3. Bellani evaporimeter 4. Ottawa, Canada.**—*A.A., M.R.*

9.4–178 551.573:551.588.4

Rycroft, H. B. (*Dir., Nat. Botanic Gardens, Kirstenbosch*), **The effect of riparian vegetation on water-loss from an irrigation furrow at Jonkershoek.** *South African Forestry Association, Pretoria, Journal*, No. 26:2–8, **1955.** 2 figs., 2 photos., table, 16 refs. **DWB**—During hot dry weather the streams in the Stellenbosch area of Cape Province often dry up during the day and flow again at night leading to the belief that by cutting vegetation along the streams, the evaporation losses would be reduced. In Feb. and March 1953 (two rainless months) daily water losses by evapotranspiration were measured on an experimental plot at Jonkershoek Forest Influences Research Station near Stellenbosch, before and after removal of vegetation. Data are shown in tables and regression curves, indicating that before removal the mean loss was 28.73 (thousand gallons a day) and after removal only 21.9 thousand gallons, and in the former case the increased loss was 1012 gallons/1°C, and in the latter 522 gallons/day, with high degree of confidence. This is in spite of increased evaporation from the stream itself when vegetation is cut. *Subject Headings:* **1. Evapotranspiration 2. Vegetation effects on evaporation 3. Stellenbosch, Cape Province, S. Africa.**—*M.R.*

9.4–179 551.573:551.508.72

Uhlig, Siegfried, **Bestimmung des Verdunstungsanspruchs der Luft mit Hilfe von Piche-Evaporimetern.** [Calculation of evaporation force of the atmosphere by means of the Piche evaporimeter.] *Germany. Deutscher Wetterdienst, Mitteilungen*, 2(13), **1955.** 24 p. 14 figs., 9 refs. **DWB, DLC**—The author analyzes the atmospheric evaporation measurements made with a PICHE evaporimeter carried out by the West German Weather Service at a network of stations from July 16 to Oct. 16, 1954. The contents of this monograph include the following: a description of the structure and handling of the Piche evaporimeter, effect of precipitation, wind and radiation upon the setting up of the instrument, graphs giving pentad values of evaporation at four stations, comparison between evaporation and other meteorological variables, annual variation evaporation, and actual evaporation and potential evapotranspiration of plant covered soil. *Subject Headings:* **1. Evaporation measurements 2. Piche evaporimeter 3. Evapotranspiration 4. West Germany.**—*I.L.D.*

CONDENSATION

See: **Conf. on the Physics of Cloud and Precip. particles, 9.4–3.**

FOG

9.4–180 551.575.1:551.524.4

Urfer, Alfred (*Asst. meteorologist, Aérodrome, Zurich*), **Brouillards de rayonnement et gradient vertical de température.** [Radiation fog and vertical temperature gradient.] *La Météorologie*, Paris, Ser. 4, No. 45/46:101–107, Jan./June **1957.** 4 figs., 2 tables, 5 refs. French, English and German summaries, p. 101. **DWB**—The author demonstrates the fact that it is not always true to admit that fog is always connected with a temperature inversion on the ground. From the observation-data assembled, it appears instead that the majority of fogs—including radiation-fog—show a temperature lapse-rate similar to that of the wet-bulb-adiabatic. The pre-existant temperature-inversion near the ground, necessary to fog-formation, disappears and forms again on top of the saturated layer. The influence of the nature of the underlying surface (solid ground, snow or water) is of some, if not of decisive, importance. *Subject Headings:* **1. Radiation fog 2. Vertical temperature gradient 3. Temperature inversions.**—*Author's abstract.*

9.4–181 551.575.2:629.139(421)

Evans, D. C., **A second report on fog at London Airport.** *Meteorological Magazine*, London, 86(1025):333–339, Nov. **1957.** 2 figs., 5 tables, 2 refs. **DWB**—Hourly fog frequencies are now available for 10 years at London Airport and histograms are given for visibilities less than 220, 440, 880 and 1100 yds, Oct.–March. Maximum an hour after sunrise and at midnight, but there is a tendency for smoke fogs to disperse late in the evening and for thick fog to disperse during daylight. The frequencies are compared with those found by N. E. Davis for first 4 years at London Airport and with water fogs at Cardington. *Subject Headings:* **1. Fog distribution 2. Airports 3. London, Eng.**—*C.E.P.B.*

CLOUDS

9.4–182 551.576.1

*Clodman, J. (*Res. and Training Div., Met. Ser. of Canada*), **Some statistical aspects of cirrus cloud.** *Monthly Weather Review*, Wash., D. C., 85(2):37–41, Feb. **1957.** 3 figs., 11 tables, 8 refs. **DWB, DLC**—Over 2500 Canadian aircraft reports obtained during 1950–56 were analyzed to determine the occurrence of cirrus at 30, 35, 40 and 50 thousand feet with relation to region (of Canada), undercast and precipitation, season, height of base and top, amount of cirrus, thickness of layer, visibility in clouds, height of tropopause, temperature of base of layer, etc. A number of cases occurred at each season above the tropopause or in the stratosphere (about 5% of cases). Conditions for 19 of these cases (height of base, top, tropopause, air mass and distance of base and top from tropopause) are reviewed. A slight tendency is shown (in an ogive) for cirrus to form close to the −40°C level; also 70% of cirrus bases occur within a 10,000 ft range. *Subject Headings:* **1. Cirrus clouds 2. Cloud base and top heights 3. Canada.**—*M.R.*

9.4–183 551.576.11:778

Bradbury, T. A. M., **Cloud pattern over the Mediterranean.** *Meteorological Magazine*, London, 86(1025):347–348, Nov. **1957.** fig., photo. **DWB**—Photo on March 26, 1957. 34°10′N, 28°30′E, from Comet at 41,500 ft, shows StCu probably below 5000 ft, suggesting cyclonic circulation. *Subject Headings:* **1. Cloud formations 2. Cloud photographs 3. Mediterranean.**—*C.E.P.B.*

9.4–184 551.576.11:551.515.4:551.501.81

Feteris, P. J., **Onderzoek van de structuur van onweerswolken met radar.** [Research in the structure of nimbus clouds by means of radar.] *Hemel en Dampkring*, The Hague, 54(7/8):142–147, July/Aug. **1956.** 4 figs. **DWB, DLC**—The structure of storm clouds was studied by means of a very sensitive and a moderately sensitive radar receiver. The development of cumulonimbus, the characteristics of clouds associated with lightning and the formation of hail are discussed with the aid of radar photographs and diagrams. *Subject Headings:* **1. Radar cloud observation 2. Cumulonimbus development 3. Radar photographs.**—*I.L.D.*

9.4–185 551.576.11

Tardos, Béla, **A gomolyfelhők szintjének meghatározásáról.** [Determination of the level of cumulus clouds.] *Repülés*, Budapest, 6(10):13, May 25, **1954. DLC**—A method is described for determining the likelihood of cumulus formation and the height at which it will take place. The calculations are based on surface temperature and dewpoint temperature, lapse rate, and expected maximum temperature for the day. *Subject Headings:* **1. Cumulus cloud formation 2. Cloud height.**—*G.T.*

9.4–186 551.576.11

Wentelt een cumulus lenticularis? [Does a cumulus lenticularis revolve?] *Hemel en Dampkring*, The Hague, 53(11):207, Nov. 1955. photo. **DWB, DLC**—In the Dec. 7, 1953 issue, a photograph of a rotating lenticular cloud was reproduced; another example was photographed by A. Reed in the Snowy Mts., New South Wales, and was published in **Weather** (1954). The question has arisen whether clouds rotate about a vertical axis. A photograph taken of such a cloud at Heard Island is reproduced. *Subject Headings:* **1. Cumulus lenticular clouds 2. Cloud photographs 3. Heard Island.**—*I.L.D.*

9.4–187 551.576.4(5)

*Venkateswara Rao, D. (*Regional Met. Centre, Calcutta*), **Heights of base and top and thickness of tropical clouds.** *Indian Journal of Meteorology and Geophysics*, New Delhi, 6(4):299–316, Oct. **1955.** 3 figs., 12 tables, 11 refs. **DWB, DLC**—The author analyzes data on the heights of the base and top of all types of high and medium clouds and of thunderclouds available for 1952 and 1953 in reports of Comet and Jet Airlines flying over India, Ceylon, Malaya and Thailand. The data on percentage frequency of heights of base and top of high and medium clouds, on maximum and minimum heights of high and medium clouds, on frequency of thickness of all types of clouds, on minimum and mean heights of base and tops of tropical clouds, etc., are presented in tables. *Subject Headings:* **1. Cloud base and top heights 2. Cloud height data 3. Tropical clouds 4. Southeast Asia.**—*I.L.D.*

PRECIPITATION

See also: **Rainfall interception by forests** (U. S. Dept. of Agric.), 9.4–32; **Precip. distribution in forests** (Baumgartner), 9.4–55; **Precip. measurement** (Schirmer), 9.4–66; **Rainfall frequency distribution** (Schumann), 9.4–67; **Radar rainfall intensity measurement** (Ill. State Water Survey), 9.4–69 and 9.4–70; **Precip. totalizers** (Furlan), 9.4–92; **Precip. measurement** (Grunow), 9.4–93; **Evaporation-precip.-temp. relationships, Alps** (Reichel), 9.4–176; **Playa rainfall-runoff relationships** (Bogdanov), 9.4–220; **Atmos. potential gradient during precip.** (Dvali), 9.4–269.

9.4–188 551.577:551.579.4

*Frolow, Vladimir, **La composante annuelle: pluviométrie et hydrométrie en Argentine.** [The annual regime in Argentina with respect to rainfall and stream flow measurements.] *Académie des Sciences, Paris, Comptes Rendus*, 200:2206–2208, June **1935.** diagr., table. **DLC**—A comparative study of the annual trends of rainfall and stream flow. The phases are traced throughout the year and an attempt made to analyze the reasons for the discrepancies between rainfall and stream flow, when they are out of phase, etc. *Subject Headings:* **1. Rainfall-stream flow relationships 2. Argentina.**—*Author's abstract.*

9.4–189 551.577(417)

*Pollak, L. W. and Morley, T. J., **The climate of Dublin City, Pt. 1, Rainfall at Trinity College.** *Dublin Institute for Advanced Studies. School of Cosmic Physics, Geophysical Bulletin* No. 12, Jan. **1956.** 31 p. fig., photo, 11 tables. **DLC**—Elaborate tables, based on punched card analysis of 50 years of record at the same spot (1904–53) with comparison with normals for 1881–1915. Besides the usual monthly and annual values of rainfall and rainy days, greatest precipitation in 24 hours during the month, etc., there are several tables giving the values for these elements arranged in ascending order for the 50 years, for each separate month, along with corresponding values in each case for the other 3 elements (number of rain days 0.2 mm or more, number of wet days 1.0 mm or more, and greatest 24 hour amount). Averages and percent of normal for each month, for each decade for 1904–53 are compared. *Subject Headings:* **1. Rainfall data for Dublin 2. Dublin, Ireland.**—*M.R.*

9.4–190 551.577.2(436)

*Lauscher, Friedrich and Roller, Maria (*both, Vienna*), **Die Schwankungen der Niederschlagsabhängigkeit von der Seehöhe, beurteilt nach dreissigjährigen Totalisatoren-Beobachtungen in den Hohen Tauern.** [Variations in the dependence of precipitation as determined from 30-year observation of totalizers in the High Taurus Mountains.] *Wetter und Leben*, Vienna, 8(8/11):180–187, **1956.** 5 tables, 6 refs. **DLC**—Statistical data in tables are given for the following: normal monthly precipitation for different regions at varying altitudes, frequency of monthly precipitation in percent of normal monthly rainfall for each of the different regions, annual amount of precipitation in percent of normal in the individual years from 1927–1941 for each region, etc., correlation between the annual totals of precipitation in the different regions, etc. It is seen that the height of 3000 m. in the area of maximum precipitation above and below this height precipitation decreases. The value of totalizers in analyzing precipitation is indicated by the detailed discussions of the characteristics of the

precipitation in the area. *Subject Headings:* **1. Precipitation data 2. Area precipitation distribution 3. Taurus Mountains, Austria.**—*I.L.D.*

9.4–191 551.577.2:551.577.51

Milosavljevic, M. and Milosavljevic, K. (*both, Univ. of Belgrade, Yugoslavia*), **Précipitations dans les montagnes de la République Populaire de Serbie.** [Precipitation in the mountains of Serbia.] *La Météorologie*, Paris, Ser. 4, No. 45/46:225–230, Jan./June **1957.** 6 figs., 4 tables, 5 refs. French, English and German summaries, p. 225. **DWB**—The aim of this investigation is to show the influence of different mountains of the People's Republic of Serbia on the distribution of precipitations in their regions. This influence was analysed in two cases: 1) at a mountain which is not very high, but stands alone (the mountain of Fruska Gora) and 2) at a high mountain enclosed in a mountain-system (the mountain of Kopanonik). The analyses of data of precipitations from the period of 1948 to 1956 (VI) leads to the following conclusions: that a mountain, which is not very high but stands alone, has an influence on the increase of precipitation which is more marked than at a high mountain enclosed in a mountain-system. *Subject Headings:* **1. Precipitation distribution 2. Orographic influences 3. Fruska Gora, Yugoslavia 4. Kopanonik, Yugoslavia.**—*Authors' abstract.*

9.4–192 551.577.2:551.577.51

Rein, F. (*Geophys. Inst. d. Tchechosl. Akad. d. Wiss. Prague*), **Einige Einflüsse der Gebirge auf die Niederschlagsverteilung im Westteil der Tschechoslovakei.** [Some orographic influences on precipitation distribution in western Czechoslovakia.] *La Météorologie*, Paris, Ser. 4, No. 45/46:221–224, Jan./June **1957.** 6 figs., ref. German, French and English summaries, p. 221. **DWB**—The influences of the forced vertical movements of air masses caused by their passage over the Bohemian mountain ranges can be seen in the fact that, on their leeward side, the precipitations and the thunderstorm frequency are often diminished up to a distance of about 100 H (H being the relative height of the mountain). On the windward side, however, the precipitations and the thunderstorm activities increase and sometimes multiply. But the windward effects do not appear as pronounced as the leeward effects. Also, the distance up to which it can be noticed, is only about 50 H. To wind effects, in addition to the weakening or the strengthening of the precipitation, can also be attributed some peculiarities in the distribution of variability characteristics of monthly precipitation totals. *Subject Headings:* **1. Precipitation distribution 2. Orographic influences 3. Western Czechoslovakia.**—*Author's abstract.*

9.4–193 551.577.21:551.588.2(437.1)

Rein, František, **Poznámky k přibyvání srážek s rostoucí nadmořskou výškou, I. Aplikace grafické korelační methody podle Prof. Šalamona.** [Increase of precipitation with increasing altitude, Pt. 1, Application of the graphic correlation method of Prof. Salamon.] *Meteorologické Zprávy*, Prague, 7(2):48–51, **1954.** 3 figs., 4 refs. Russian and English summaries p. 48. **DLC**—The dependence of annual average precipitation in Bohemia on height above sea level of the observation station is investigated by means of the graphical correlation method developed by Salamon. Four zones of correlation are established, two for elevations under 600 m a.s.l. and two for elevations over 700 m a.s.l. Between 600 and 700 m, a transition zone was found in agreement with Láska; in this zone no linear correlation can be found between the values investigated. The existence of two regions of correlation in each height range may be accounted for by upwind and downwind effects over the foot-hills of western and eastern Bohemia, respectively. According to prevailing flow patterns the boundary between the upwind and downwind zone is roughly identical with the 14°30′E meridian. (For Pt. 3 of this study *see* 7.8–208, Aug. 1956, *MAB.*) *Subject Headings:* **1. Vertical precipitation variations 2. Bohemia, Czechoslovakia.**—*Trans. of author's abstract.*

9.4–194 551.577.3(97)

Freeman, M. H., **Rainfall at Christmas Island (1°57′N 157°27′W).** *Meteorological Magazine*, London, 86(1025):347, Nov. **1957.** **DWB**—Note on variability of rainfall in space and time. Oct. 15, 1956 to March 18, 1957, total only 0.87 in. then 1.82 on March 29. April

3, 1.05 in. at official station, 12 in. 4 mi away. *Subject Headings:* **1. Rainfall variability 2. Christmas Island, Pacific Ocean.**—*C.E.P.B.*

9.4–195 551.577.37(569.4)

*Amiran, D. H. K. and Gilead, M., **Early excessive rainfall and soil erosion in Israel.** *Israel Exploration Journal*, Jerusalem, 4(3/4):286–295, **1954.** 5 figs., 2 tables. Also issued as *Israel. Meteorological Service, Ser. D, Contributions, No. 4.* **DWB**—The annual and spatial distribution of excessive rainfall (daily amounts in excess of 50 and 25 mm) in Israel is discussed and the synoptic situations of a number of cases of excessive rainfall is presented. Excessive rainfall is shown to be the result of an influx of deep, moist and cold Polar air into the Eastern Mediterranean along meridional trajectories establishing contact with warm surface air in a Cyprus low. Maps showing the rainfall distribution in Israel and tables giving the incidence of rainfall at different stations and synoptic charts are presented. *Subject Headings:* **1. Excessive rainfall 2. Rainfall distribution 3. Soil erosion 4. Israel.**—*I.L.D.*

9.4–196 551.577.3

Balseinte, Raymond (*Institut de Géographie Alpine, Grenoble Univ., France*), **Les changements intervenus dans les régimes pluviométriques moyens des Alpes françaises du Nord pendant la période (1935–1950).** [Changes in the average precipitation distribution in the Northern French Alps during the period 1935–1950.] *La Météorologie*, Paris, Ser. 4, No. 45/46:185–189, Jan./June **1957.** fig., table, 18 refs. French, English and German summaries, p. 185. **DWB**—The period from 1935–1950 is characterized by the appearance of winter as a season of maximum average rainfall in some meteorological stations of Haute-Savoie, Savoie and Isère. The question to be resolved is to know whether this winter pluviometrical maximum must be ascribed to better nivometrical measures or to a climatic change compared with the period from 1881 to 1910 to which Mr. BENEVENT refers in his masterly thesis on the climate of the French Alps. *Subject Headings:* **1. Maximum average precipitation 2. Precipitation measurement improvement 3. Precipitation trends 4. Northern French Alps.**—*Author's abstract.*

9.4–197 551.577.37(423)

Bleasdale, A., **Rainfall at Camelford, Cornwall, on June 8, 1957.** *Meteorological Magazine*, London, 86(1025):339–343, Nov. **1957.** fig., 3 photos. **DWB**—Largest measurement 7.09 in. (5.43 in 2½ hrs) but nearly an inch was lost in bouncing hail and fall from 12.30 to 1.30 was probably 4 in. Estimated fall E of Camelford exceeded 9 in., decreasing rapidly to SE; 4 bridges damaged. *Subject Headings:* **1. Excessive rainfall 2. Camelford, Cornwall.**—*C.E.P.B.*

9.4–198 551.577.37:551.577.61

Ward, Nicolas (*Beirut, Lebanon*), **Katastrofalna kiša u Tripoliu 17 decembra 1955.** [Disastrous rainstorm at Tripoli on Dec. 17, 1955.] *Yugoslavia. Hidrometeorološka Služba, Vesnik*, 5(3/4):97–99, July/Dec. **1956. DWB**—The synoptic development which led to a cloudburst at Tripoli is described. Rainfall amounts up to 125 mm were measured in the vicinity of Tripoli in connection with the passage of a cold front. The ensuing floods caused damage in the millions and 150 casualties. *Subject Headings:* **1. Excessive rainfall 2. Flood damage 3. Tripoli, North Africa.**—*G.T.*

9.4–199 551.577.51:551.577.2

§Spinnangr, Finn, **On orographic precipitation in Norway.** *I.U.G.G. Association of Meteorology, Rome, Sept. 1954, Scientific Proceedings.* London, Butterworth, **1956.** p. 38–43, 7 figs. **DWB**—The author examines the distribution of precipitation when warm front surfaces of different orientation pass over southern Norway and in weather situations with instability towards the sea as exemplified in a maritime tropical air current in March 23–26, 1953 and Oct. 9, 1953. Synoptic maps of the weather situations, isohyetal maps and a detailed analysis of the precipitation distribution are presented, and a possible circulation mechanism accounting for it is suggested. *Subject Headings:* **1. Orographic rainfall 2. Synoptic analysis 3. Precipitation distribution 4. Norway.**—*I.L.D.*

RAIN AND SNOW

See also: **Wind effects on snowgages** (Warnick), 9.4–15; **Snow cover measurement** (Inoue, Sanbongi), 9.4–94; **Precip. totalizers** (Morel), 9.4–95; **Weather effects on avalanches** (Condet), 9.4–129; **Cold fronts and hailstorm damage, Alps** (Reya), 9.4–139; **Temp. measurements over snow surface** (Berg), 9.4–151; **Soil temp. calculations** (Gutman, Doroganevskaia), 9.4–159; **Snow cover** (Poggi), 9.4–206; **Precip. and snow measurements** (Zingg), 9.4–218; **Forecasting visibility in rain** (Poliakova), 9.4–262; **Electrical charges on raindrops** (Krasnogorskaia), 9.4–273.

9.4–200 551.578:551.594

Barla, M. (*Italian Met. Service, Turin, Italy*), **Types de précipitations solides dans les hautes vallées de Suse et d'Aoste et leur corrélation avec le champ électrique atmosphérique.** [Types of solid precipitation in the high valleys of Susa and Aosta and their correlations with the electric field of the atmosphere.] *La Météorologie*, Paris, Ser. 4, No. 45/46:213–216, Jan./June **1957.** photo, 2 tables. French, English, German and Spanish summaries, p. 213. **DWB**—Results of observations about the principal types of usual precipitation and their crystalline components are set forth—solid precipitation having occurred in Susa and Aosta high valleys during 1954–1955 in relation to the electric-atmospheric field as was measured in the vicinity of the ground. *Subject Headings:* **1. Solid precipitation-atmospheric electricity relationships 2. Susa, Italy 3. Aosta, Italy.**—*Author's abstract.*

9.4–201 551.578.1

Mertz, J. and Striffling, M., **Sur le mécanisme des pluies dans la vallée du Rhône et les Préalpes les 8 et 9 décembre 1954.** [Mechanism of the rainfall in the Rhone valley and the outer Alps on Dec. 8 and 9, 1954.] *La Météorologie*, Paris, Ser. 4, No. 45/46:237–249, Jan./June **1957.** 10 figs. French, English and German summary, p. 237. **DWB**—This meteorological situation consists successively of: 1) the arrival of warm, moist air coming from the south and producing abundant orographic rains in the Rhone valley; 2) the arrival of cold air coming from the northwest, with the blocking of the front against the outer Alps and strong precipitations on south-eastern France. The progress of warm and cold air can be followed on the maps with precision; this permits a detailed study of the rain mechanism. Finally, the timing of the phenomena is such that it allows the separation of the orographic rains formed in the warm air itself from the cold-frontal rains. *Subject Headings:* **1. Rainfall mechanics 2. Rhone Valley 3. Alps.**—*Authors' abstract.*

9.4–202 551.578.11:541.132.3

*Mukherjee, A. K. (*Met. Off., Jodhpur*), **Hydrogen ion concentration of monsoon rain water at Calcutta.** *Indian Journal of Meteorology and Geophysics*, Delhi, 8(3):321–324, July **1957.** 2 tables, 2 refs. **DWB, DLC**—A study of how pH content of rainwater obtained at Jadavpur (Univ. grounds), India varied with time and with amount of precipitation. Measurements of pH were made immediately after collection of the samples. High values have been explained as being due to presence of ammonia in the air (from cattle). Winds aloft data shows that most of the air came from the SSW or SE whereas large cattle populations exist in the villages. However the pH values do not decrease with time as they should if the above hypothesis were correct. Hence it is concluded that a neutral or stable value of pH of 7.0, rather than the value of 5.7 (given by Barrett and Brodin, 1955) should be used, assuming that CO_2 is dissolved slowly by rainwater and is not in equilibrium. *Subject Headings:* **1. pH content of rainwater 2. Carbon dioxide dissolved by rain.**—*M.R.*

9.4–203 551.578.4

de Quervain, M., **Die Festigkeitseigenschaften der Schneedecke und ihre Messung.** [Strength properties of a snow cover and its measurement.] *Geofisica Pura e Applicata*, 18:179–181, **1950.** 8 figs. (incl. photos.), 5 refs. **DLC**—A survey of methods of measuring strength and hardness of snow. Instruments, both old and new, are described. A hardness scale is introduced, which does not require any instruments. Profiles (i.e., Feb. 1, 1950) are plotted to show various parameters measured at 0–150 cm. depth, and micro-photographs show structure at 6, 23, 49 and 86 cm. depth. Measurements were made at Weissfluhjoch.

Subject Headings: **1. Snow hardness measurement 2. Snow hardness tester 3. Snow profiles.** —*M.R.*

9.4–204 551.578.4

Orlov, V. I., **Snezhnye narosty.** [Snow growth formations.] *Priroda*, Moscow, 46(2): 125–126, Feb. **1957.** fig. **DLC**—Description of peculiar snow formations on trees during alternating periods of severe frost and thawing weather. *Subject Heading:* **1. Snow formations.** —*A.A.*

9.4–205 551.578.41

Magono, Chōji and Oguchi, Hachiro (*Tokyo Art Univ.*), **Classification of snow flakes and their structures.** *Yokohama National Univ., Kamakura, Japan, Science Reports, Sec. 1,* No. 4:47–57, Oct. **1955.** 2 figs., 2 tables, 9 refs.—Flakes were classified according to metamorphic stages, shapes during fall, and crystal types. Combinations of types, manner of contact between crystals, adhesive power between snow crystals and large snow flakes are discussed in relation to temperature, weather, etc. Types and contact mechanisms are illustrated. *Subject Headings:* **1. Snowflake types 2. Snow crystal structure.**—*M.R.*

9.4–206 551.578.41:551.578.46

Poggi, A. (*Grenoble, France*), **La neige au sol.** [Snow cover.] *La Météorologie*, Paris, Ser. 4, No. 45/46:95–100, Jan./June **1957.** 4 figs., 3 refs., eq. French, English and Spanish summaries p. 95. **DWB**—In the following account, the author begins by defining the characteristics of the snow on the ground, and an outline of the metamorphosis of snow-flakes. In the second part an account is given of the mechanism of the evolution of the snow-mantle. The account ends indicating some methods for the investigation of the snow cover. *Subject Headings:* **1. Snow cover 2. Snow metamorphosis.**—*Author's abstract.*

9.4–207 551.578.41

Yoshida, Zyungo, **A quantitative study on metamorphosis of snow crystal.** *Low Temperature Science, Ser. A, Physical Sciences*, Sapporo, Japan, 13:11–28, **1954.** 6 figs., 5 refs., 40 eqs. In Japanese; English summary p. 26–28. **DWB**—An elaborate theoretical and practical study of the changes and stresses in snow crystals produced by sublimation and bending. It was found that at sub-freezing temperatures, the vapor pressure and hence evaporation at points or edges with positive curvature is greater than on pits or grooves—hence the points will tend to be smoothed or rounded and the pits to fill up by deposition. The bending at the roots of branches where thinning occurs was also studied from the point of view of the above, and also of the bending stress. Discrepancies were found between theory and experiment both with respect to time and length of the thinning part. If elastic stress due to weight of branches were cause of breaking, it would take $\frac{1}{2}$ million years if L (length) $= 2a$ (radius). *Subject Heading:* **1. Snow crystal metamorphosis.**—*M.R.*

9.4–208 551.578.45

Gavrin, V. F., **Neobychaĭnyĭ snegopad.** [Unusual snowfall.] *Priroda*, Moscow, 45(5): 125, May **1956.** **DLC**—A description of a snowfall that occurred on May 19, 1952 at Belovezhskaia Pushcha. The snow fell continuously for 6 hours in large friable flakes 3 cm. in diameter. The snow cover attained a thickness of 4 cm. and melted towards evening. The weather conditions preceding and following this snowfall and the effect upon birds, etc. is described. *Subject Headings:* **1. Excessive snowfall 2. Belovezhskaia Pushcha, U.S.S.R.**—*I.L.D.*

9.4–209 551.578.45

Grigor'ev, D. P., **Snegopady v Amurskoĭ oblasti.** [Snowfalls in the Amur region.] *Priroda*, Moscow, No. 3:125–126, March **1957.** **DLC**—Normally the winters in the Amur region are cold and dry. A few exceptional snow storms with resulting effects on traffic and other damages are described. *Subject Headings:* **1. Snowstorms 2. Amur region, Siberia.** —*A.A.*

9.4–210 551.578.46

Berkemeijer, A. J. A., **Sneeuwpuzzle.** [Snow puzzle.] *Hemel en Dampkring*, The Hague, 54(6):129, June **1956.** 2 photos. **DWB, DLC**—The peculiar deposition of snow in a yard consisted of the fact that at the edges of the yard the stones were not covered with snow, but only in the center was a small area covered with a thin layer of snow. Two different types of stones were present: a porous lava stone upon which the snow remained and a field stone which was free of snow. *Subject Heading:* **1. Snow deposition.**—*I.L.D.*

9.4–211 551.578.46:551.524

Bossolasco, M. and Dagnino, I. (*both, l'Université de Gênes, Italy*), **Densité de la neige et température de l'air.** [Snow density and atmospheric temperature.] *La Météorologie*, Paris, Ser. 4, No. 45/46:207–211, Jan./June **1957.** 4 figs., 5 refs. French, English and German summaries, p. 207. **DWB**—Based on meteorological observations made on the Säntis (2500 m), the relation between the density of fresh snow and the air temperature during the snow fall is shown and discussed. From the data of several Swiss stations some results of the behavior of the layer of snow are then given. *Subject Headings:* **1. Snow density-temperature relationships 2. Säntis, Switzerland.**—*Authors' abstract.*

9.4–212 551.578.46

Fontaine, P., **Contribution à l'étude de l'enneigement moyen, d'hiver et de printemps, dans les Alpes françaises.** [Average snow cover in winter and spring in the French Alps.] *La Météorologie*, Paris, Ser. 4, No. 45/46:43–48, Jan./June **1957.** 5 figs., 2 eqs. French, English and Spanish summaries, p. 43. **DWB**—The observations relative to snow cover in the French Alps, made by the Hydrometeorological service of the Electricité de France during the years 1952 to 1955, have established provisional snow cover averages from an altitude of 800 to 1600 metres in the 4 principal basins of this mountain range. From these averages there has appeared for the 4 years examined a certain periodic recurrence which has enabled one to define an average heavy and slight snow cover. Interest in this data must be apparent in the realms of winter-sports, flood and avalanche warnings. *Subject Headings:* **1. Snow cover 2. Winter sports 3. Avalanches 4. French Alps.**—*Author's abstract.*

9.4–213 551.578.46:796

Franco, Jean, **Les quatre saisons de la montagne.** [The four seasons in the mountains.] *La Météorologie*, Paris, Ser. 4, No. 45/46:15–21, Jan./June **1957.** 4 plates (photos). French, English and Spanish summaries, p. 15. **DWB**—With the object of facilitating the sporting activities of the mountaineer and skier during the season called ⟨⟨Winter Sports⟩⟩ the author has particularly applied himself to expose the main characteristics of snowing-up in the medium and high mountains, under the influence of the variation of the principal meteorological factors. *Subject Headings:* **1. Snowing-up 2. Winter sports.**—*Author's abstract.*

9.4–214 551.311.128 551.578.48

Oulianoff, Nicolas, **Ecroulements de glaces et avalanches de neige.** [Falling of ice and avalanches of snow.] *Société Vaudoise des Sciences Naturelles, Bulletin*, 66(286):19–25, June 15, **1954.** fig. **DWB**—The force engendered by an ice avalanche is at least 27 times as great as by a snow avalanche. *Subject Headings:* **1. Ice avalanches 2. Avalanches.**—*M.R.*

9.4–215 551.578.48

Poggi, A. (*Grenoble, France*), **Analyse des avalanches au cours de l'hiver 1954–1955 dans la région de la Romanche et du Vénéon et dans la Vallée de Chamonix.** [Analysis of avalanches during the winter 1954–1955 in the Romance and Veneon regions and the Chamonix Valley.] *La Météorologie*, Paris, Ser. 4, No. 45/46:65–93, Jan./June **1957.** 10 figs. French, English and Spanish summaries p. 65. **DWB**—In this analysis the author attempts to determine the importance of the diverse meteorological factors (precipitations, temperatures, winds), and the factors of heights and level (resistance and structure of mantle) in the releasing of winter avalanches. To conclude, the author tries to estimate the amount of precipitations

likely to provoke the release of the phenomenon. *Subject Headings:* **1. Avalanches 2. Avalanche meteorology 3. Chamonix Valley, France.**—*Author's abstract.*

9.4–216 551.578.48:796(02)

†Schweizerische Geotechnische Kommission, **Lawinen: die Gefahr für den Skifahrer.** [Avalanches: their hazards for skiers.] Zurich, Aschmann & Scheller, **1940.** 114 p. 79 figs. (incl. photos), 34 refs. **DLC**—A guide for skiers, giving a great deal of information on the origin, growth, movements, settling and drifting of snowflakes; the characteristics of new, old and special forms of snow; temperature and temperature measurements in and on a snow cover, porosity; avalanches, their origin, types, influence of weather, topography, snow structure, temperature, radiation, wind, snow surveys and sampling; avalanche forecasting and other protective measures, artificial triggering of avalanches, avalanche prevention structures; rescue techniques and lastly details of 16 catastrophic avalanches in Swiss Alps and a list of references. *Subject Headings:* **1. Avalanche textbooks 2. Avalanches 3. Snow physics 4. Avalanche protection 5. Skiing 6. Switzerland. I. Schweizerische Naturforschende Gesellschaft.**—*M.R.*

9.4–217 551.578.48

Viaut, André (*Div. Met. Nationale*), **Météorologie et avalanches Alpines au cours des années 1943–1952.** [Weather and Alpine avalanches, 1943–1952.] *La Météorologie*, Paris, Ser. 4, No. 45/46:7–13, Jan./June **1957.** fig. French, English and Spanish summaries, p. 7. **DWB**—The author mentions the atmospheric conditions that accompanied, in the Alps, the most characteristic avalanches of the period 1943–1952. He concludes that at any rate during winter time, the masses of warm air coming either from the Atlantic or the Mediterranean are the origin of the release of the avalanche. *Subject Headings:* **1. Avalanches 2. Avalanche meteorology.**—*Author's abstract.*

9.4–218 551.578.46:551.578.41

Zingg, Th. (*Inst. Fédéral pour l'Étude de la Neige, Davos*), **Weitere Erfahrungen über die Niederschlagsmessung.** [Further experience in precipitation measurement.] *La Météorologie*, Paris, Ser. 4, No. 45/46:141–142, Jan./June **1957.** German, French and English summaries, p. 141. **DWB**—In the observation areas situated in the neighborhood of the Weissfluhjoch Institute, the surface of the snow cover is marked every fortnight. The water equivalent of the different layers of snow can thus be measured several times each winter, permitting the evaluation of the homogeneity of the deposit and the control of the totalisators of the region. The results show once more how questionable is the use of totalisators in the mountains. Besides, it has been shown how dangerous it is to establish the thickness of the snow in an area from a single snowdepth-gauge. *Subject Headings:* **1. Snow measurement 2. Water content of snow.**—*Author's abstract.*

HYDROMETEOROLOGY

See also: **Iaroslav Hydromet. Bureau** (Popov), 9.4–27; **Hydromet. stations** (Popov), 9.4–28; **Soil moisture measurement** (Maricic), 9.4–64; **Soil moisture measurement** (Pletser), 9.4–65; **Water supply forecasting** (Martel), 9.4–104; **Flood probability** (Moran), 9.4–108; **Flood forecasting** (Szesztay), 9.4–109; **Soil moisture measurements, Canadian prairies** (Wilner), 9.4–154; **Soil moisture measurements** (Blanc), 9.4–158; **Rainfall-stream flow relationships, Argentina** (Frolow), 9.4–188; **Maximum river discharges** (Mokliak), 9.4–224; **Mountain climates and stream flow** (Pardé), 9.4–248.

9.4–219 551.579(262.54)

Berenbeim, D. Ia., **Novoe v gidrologichekom rezhime Azovskogo moria i Kerchenskogo proliva.** [New features in the hydrology of the Azov Sea and Kerch Strait.] *Priroda*, Moscow, 46(2):77–79, Feb. **1957.** 2 figs., 2 refs. **DLC**—The Azov Sea, until recently the most productive sea in the world, is gradually losing its abundance of fish. Large scale

modifications in the runoff regime due to hydrostructures cause hydrologic changes which are described briefly. Expensive modification in the Kerch Strait might improve the situation. *Subject Headings:* **1. Hydrostructures 2. Hydrologic changes 3. Azov Sea 4. Kerch Strait.** —*A.A.*

9.4–220 551.579:551.577

*Bogdanov, V. V., **Vremennyĭ poverkhnostnyĭ stok na takyrakh.** [Temporary surface flow on playas.] (In: Akademiia Nauk SSSR. Botanicheskiĭ Institut, **Pustyni SSSR i ikh osvoenie,** Vol. 2. Moscow, Akad. Nauk SSSR, **1954.** p. 488–507. 9 tables, 23 refs.) **DLC**—A review of the literature and comprehensive discussions of the hydrology of the playas of the Turkmen SSR, in particular to the Kara Kum desert. The seasonal rainfall regime is discussed and the relationship between rainfall and surface runoff is discussed. Data are given on annual runoff per 1 km² and mean number of days with runoff for the individual years 1931–1940, mean monthly runoff per 1 km², total runoff by regions for all the playas of the Turkmen SSR annual runoff coefficient, etc. *Subject Headings:* **1. Playa hydrology 2. Rainfall-runoff relationships 3. Runoff data 4. Turkmen, SSR.**—*I.L.D.*

9.4–221 551.579.2

Formozov, A. N., **V period snegotaianiia.** [Snow melting period.] *Priroda*, Moscow, 45(4):126, April **1956. DLC**—The snow thaw near Moscow, which occurs on the average between April 5–10, is described. The thawing process, the relationship of water content of snow to flow also are considered. *Subject Headings:* **1. Snow melt 2. Snow melt runoff 3. Moscow, U.S.S.R.**—*I.L.D.*

9.4–222 551.579.2:551.521:551.578.46

Gasser, O. (*Flughafen-Wetterwarte, Munich*), **Die quantitative Berechnung des täglichen Schmelzwasserabflusses im Einzugsgebiet des Bodensees für das Jahr 1951.** [Computation of the daily snow melt runoff in the watershed of Lake Constance in 1951.] *La Météorologie*, Paris, Ser. 4, No. 45/46:353–356, Jan./June **1957.** 4 figs., 8 refs. German, French and English summaries p. 353. **DWB**—The progress made in aerology and the recent results in the research concerning the influence of the radiation balance on the melting process of a layer of snow have revealed the chances of success of an evaluation of the daily quantity of melted water in an alpine watershed. Starting from the daily radiation balance of a layer of snow on the point of melting, lying between the snow limit and the freezing level, the daily quantity of melted water is calculated for the Lake Constance watershed, using the heat balance of the air. The annual balance of 1951 indicates that 12×10^9 cubic meters of water flowed through Lake Constance, of which 4×10^9 cubic meters are rain water and an equal amount melted water; the rest is spread over the dry periods. *Subject Headings:* **1. Snow melt runoff 2. Radiation balance 3. Lake Constance.**—*Author's abstract.*

9.4–223 551.579.4

Kaczmarek, Zdisław (*Warsaw Polytechnic Inst.*), **Standard error of probable floods.** *Acta Geophysica Polonica*, Warsaw, 5(2):74–94, **1957.** 5 figs., 9 tables, 7 refs., 28 eqs. Summary p. 94. **DWB, DLC**—The purpose of this paper is the calculation of errors arising in the determination of the frequency of flood phenomena on the basis of an n-element series of observations. The asymptotic distribution of the above-mentioned errors, dependent on the parameters of the series Q_{max} and on the number n, was derived for the distribution of K. Dębski. Finally, the notion of the frequency region is introduced. The limits of this region depend on the required degree of certainty. *Subject Heading:* **1. Flood frequency probability errors.**—*Author's abstract.*

9.4–224 551.579.4:551.45

Lowdermilk, W. C. (*Food and Agriculture Organization*), **Floods in deserts.** (In: International Symposium on Desert Research, Jerusalem, May 7–14, 1952, **Proceedings,** pub. **1953.** p. 365–377. 6 figs., 3 refs. Discussion, p. 375–377.) **DWB**—The characteristics of

floods originating in deserts are described on the bases of an analysis of the floods occurring in the Negev Desert (Israel). The author discusses desert rainfall (intensity and origin), the nature of the water load in desert floods, the immediate and cumulative effects of floods in the Negev, the origin and nature of wind flows, flood deposits, etc. *Subject Headings:* **1. Desert floods 2. Desert rainfall 3. Negev Desert, Israel.**—*I.L.D.*

9.4–225 551.482:551.579.4

Mokliak, V. I., **O prirode reduktsii maksimal'nykh moduleĭ stoka.** [Nature of the reduction of maximum discharge moduli.] *Meteorologiia i Gidrologiia*, No. 4:51–52, April **1956.** 6 eqs. **DWB, DLC**—The process of formation of maximum discharges from torrential showers in three instances when the rain simultaneously irrigates an entire basin and the durations of the incoming flow exceeds that of the outgoing flow. The graph of the variations of the width of the basin with length of the river is represented by a triangle and the partial areas between isochrones vary according to the law of natural series of numbers. The conditional magnitude of the moduli of maximum discharge is

$$M = \rho\left[\frac{A}{6(t_k+1)^2}\right].$$

Curves showing variation of modulus conditions are presented. *Subject Heading:* **1. Maximum river discharges.**—*I.L.D.*

9.4–226 551.579.4:551.481.1

*Skibniewski, Leonard, **Wahania poziomow zwierciadła wody wiekszych jezior projezierza pomorskiego i mazurskiego.** [Level variations of northern Poland's large lakes.] *Przegląd Meteorologiczny i Hydrologiczny*, Warsaw, 7(3/4):159–172, **1954.** 7 tables, 2 figs., 5 refs. In Polish; French resume p. 171–172. **DLC, DWB**—Results of a detailed study of the range of level variations of 6 large (more than 10 km²) lakes in northern Poland, and of the causes of these fluctuations based on water gage recordings for a period of 40 to 100 years, are presented and discussed. It has been found: 1) that variations of the lake levels, presented on 2 diagrams, are peculiar because of their cyclicity, and that the curve delineating them approaches the shape of a sine curve; 2) the fluctuations of levels depend primarily on changes of precipitation amounts which correspond, with a lag of approximately one year; they depend also on the influx of ground waters, etc. *Subject Headings:* **1. Lake level variations 2. Water level fluctuations 3. Poland.**—*A.M.P.*

9.4–227 551.579.5

Loehnberg, Alfred, **Water supply and drainage in semi-arid countries.** *American Geophysical Union, Transactions*, 38(4):501–510, Aug. **1957.** fig., 7 refs. **DWB, DLC**—Drainage cannot be separated from water supply for land development in hill-plain border regions of semi-arid countries. In order to avoid economic and technical *cul-de-sacs*, resulting from the usual procedures of amelioration, drainage should be considered a residual engineering task, incidental to and following the use of water resources. If it is desired to irrigate a maximum area of land, a priority of sequences must be fixed at an early stage for the measures taken to exploit successively the total inventory of surface and subsurface waters. A general scheme of priorities establishes the following precedences: (a) water supply before drainage and flood control, (b) use of subsurface before surface waters, (c) abstraction from foreland groundwater horizons before mountain ground water, (d) development of hill before valley springs, and (e) use and creation of underground storage before surface storage. It is not possible to devise a rational drainage scheme and to plan the maximum exploitation of local water resources without operating wells on a year-round basis. If this premise is accepted, wells must be sited and installed so as to serve several purposes: (a) to extract the average annual replenishment and gradually most of the fossil reserve, (b) to drain marshy lands in the plain, (c) to accept recharge from winter-spring flows, floods, and foreland wells, and (d) to extract subsurface winter flow in the foreland and to recharge it into mountain wells (recycling). *Subject Headings:* **1. Water supply 2. Drainage 3. Irrigation 4. Semiarid regions.**—*Author's abstract.*

CLIMATOLOGY AND BIOCLIMATOLOGY

CLIMATOLOGY

See also: **Statistical methods in climat.** (Drozdov), 9.4–4; **Climate and crops** (Guyot), 9.4–50; **Effect of local climate on agric.** (Gembel), 9.4–53; **Air conditioning in the tropics** (Grocott), 9.4–58; **Technoclimatology** (Böer), 9.4–59.

9.4–228 551.58(47)

Guiter, Jean, **À propos de la climatologie Russe et Soviétique.** [On Russian and Soviet climatology.] *Revue de Géographie de Lyon*, Lyons, 31(3):253–256, **1956.** 11 foot-refs. **DWB**—Notes on Soviet climatology of today, which seems from an article by KHROMOV (1951) to be similar to western climatology. French geographers have paid more attention to German and English works, though even in the days of the Czars the Russians had outstanding climatologists (VOEĬKOV, DOKUCHAEV, WILLIAMS and others). Descriptive, dynamic (complex) and physical climatology are all included in the repertoire of Soviet climatology. The author believes more students should learn to read Russian. *Subject Headings:* **1. Soviet climatology 2. Dynamic climatology. I. Khromov, S. P.**—*M.R.*

CLIMATIC ZONES

See: **Hot climates and building construction** (Drysdale), 9.4–57.

CLIMATE OF PARTICULAR PLACES

See also: **Climate, Togo** (Deneau), 9.4–13; **Climate, Arctic** (Tolmachev), 9.4–18; **Climate, Antarctica** (Buĭnitskiĭ), 9.4–19; **Climate, Antarctica,** 9.4–20; **Climate, Iraq** (U. S. W. B.), 9.4–34; **Physicogeog. classification, Hungary** (Vlasova), 9.4–231; **Climate, Tatras Mts.** (Konček), 9.4–247; **Urban climates** (Landsberg), 9.4–250.

9.4–229 551.582.1(45)

Barbanti-Silva, L. and Depietri, C., **Considerazioni climatologiche relative all'anno 1953 a Modena.** [Climatological conditions in 1953 at Modena.] *Modena, Università. Osservatorio Geofisico, Pubblicazioni*, No. 59, **1954.** 5 p. 2 refs. **DLC, DWB.** Reprinted from *Accademia di Scienze, Lettere e Arti di Modena, Atti e Memorie*, Ser. 5, Vol. 12, **1954.**—The meteorological variables for 1953 are described. In some particulars, namely: rainfall, radiation, cloudiness and relative humidity, 1953 presented interesting anomalies. There were 142 days with precipitation of which 10 days were with solid precipitation, but total precipitation was only 13.9 mm above the normal. A detailed description of the distribution of precipitation during the year is given. Mean annual relative humidity was below the normal. Number of clear days and cloudy days was less than normal. There was a great preponderance of foggy days. *Subject Headings:* **1. Climate of Modena 2. Weather anomalies 3. Modena, Italy.**—*I.L.D.*

9.4–230 551.579:551.582.1(267.5)

*Guilcher, André (*Faculté des Lettres, Nancy*), **Géomorphologie de l'extrémité septentrionale du Banc Farsan (Mer Rouge).** [Geomorphology of the extreme north of the Farsan Bank, Red Sea.] *Institut Océanographique, Monaco, Annales*, n.s., 30:56–100, **1955.** 18 figs., 21 plates, 66 refs. On cover page: **Résultats Scientifiques des Campagnes de la "Calypso," I, Campagne en Mer Rouge, 1951–1952,** and on inside title page, **II, Géomorphologie. . . . DLC** (GC1.I5).—This report contains a description of the climate of the northern portions of the Farsan shore of the Red Sea. Brief descriptions are given of the air temperature, wind (table gives monthly mean values of the wind direction frequencies), and of precipitation. Also the hydrology of the Red Sea is discussed. *Subject Headings:* **1. Climate of Farsan Bank, Red Sea 2. Climatic data 3. Hydrology 4. Red Sea.**—*I.L.D.*

9.4–231 551.4 551.582.1(439.1)

Vlasova, T. V., **Fiziko-geograficheskoe raĭonirovanie Vengrii.** [Physico-geographical regional classification of Hungary.] *Akademiia Nauk SSSR, Institut Geografii, Trudy,*

No. 59:175–199, **1954.** figs., refs. **DLC**—The physiographic regions into which Hungary is divided are as follows: the large Hungarian plain, the small Hungarian plain, the northern highlands, the Danube hills, and the Danube-Drava plateau. The physical geographic description of each region contains a brief qualitative description of the prevailing climate. *Subject Headings:* **1. Physico-geographical classification 2. Climate of Hungary 3. Hungary.** —*I.L.D.*

9.4–232 551.582.2(791)

***Arizona Statistical Review,** Phoenix, Arizona, 1956 edition. issued **1956.** 39 p. entirely tables. p. 23, **Annual runoff and water storage in Salt and Verde Rivers (and) Annual rainfall in Phoenix since 1900.** p. 38–39, **Altitude, temperature and rainfall for Arizona Cities (and) Climate comparison (and) Average relative humidity for representative cities. DWB**—On p. 23 are given histograms of annual rainfall in Phoenix for 1900–1955; on p. 38 the altitude, temperature and annual rainfall for 38 stations in Arizona, and on p. 39 the average percent possible sunshine and average relative humidity for 19 cities in the U. S. for comparison with Phoenix and Tucson. *Subject Headings:* **1. Climate of Arizona 2. Phoenix, Arizona 3. Arizona.**—*M.R.*

9.4–233 551.582.2(569.4)

*Ashbel, Dov (*Hebrew Univ. Jerusalem*), **The climate of Palestine and adjacent countries during the year 5709 (1948–1949): 29th annual report.** Tel-Aviv, Pub. by Hassadeh Library, Jan. **1950.** 32 p. numerous tables. In Hebrew; added title-page, place names and legends in Hebrew and English. **DLC** (QC990.P3A9, 1950, Hebraic Sect.)—Extensive tables of mean monthly climatic data for a number of stations in Palestine and vicinity, and frequency data of hourly temperature. Values in specified (5°C) intervals for Jerusalem, and 10 other places. Yearly frequencies are given for each year from 1930–49 for Jerusalem, Haifa, Yessod, Hamaala, Dan and Ayelet Hashahar. Evaporation, wet bulb temperature, dew, relative humidity, and temperature data are given for 30 or more stations. Monthly precipitation data for Sept. 1948–May 1949 are given for about 300 stations arranged by regions. Text is entirely in Hebrew. *Subject Headings:* **1. Climate of Israel 2. Israel.**—*M.R.*

9.4–234 551.582.2(85)

Valdivia Ponce, Jorge, **Situación climatica del año de 1954.** [Climatic situation in 1954.] *Compañía Administradora del Guano, Lima, Boletín Científico,* 2:65–71, **1955.** figs. **DWB**—An analysis of the climate of 1954 in Peru, which was marked by unusually low air temperatures in particular during the winter, on the basis of data from a network of stations extending from north to south along the Peruvian coast. The coastal strip is divided into three zones and isopleths of the annual variation of sea temperature, air temperature and atmospheric pressure and also histograms of annual variation of air temperature, of differences between air and water temperature and of relative humidity for 1954 are given for each station. *Subject Headings:* **1. Climate of Peru 2. Isopleths 3. Histograms 4. Extreme temperatures 5. Peru.**—*I.L.D.*

9.4–235 551.582.2(438)

Voeĭkov, Aleksandr Ivanovich, **Klimat Polies'ia.** [Climate of Poliesie Province.] *Sel'skoe Khoziaĭstvo i Liesovodstvo, St. Petersburg, Zhurnal,* 182(7):481–508, July **1896.** tables, refs. **DLC** (S13.S85)—Discussion based on data for 8 to 12 stations (1875–1892) of temperature, humidity, cloudiness, precipitation and evaporation, and illustrative tables, plus a comparison of periods 1875–85, and 1886–92 and remarks on the effect of drying up the bogs for agricultural purposes. Thrice daily observations are presented for most elements to show diurnal regime in Poliesie Province. No conclusive, direct evidence of effects of reclamation on climate was found in the data. Indirect evidence (frequency of radiation fog over bogs vs. reclaimed land) was also inconclusive. *Subject Headings:* **1. Climate of Poliesie Province 2. Reclamation effects 3. Poliesie Province, Poland.**—*M.R.*

CLIMATIC CHANGES

9.4–236 551.583

Goldberg, Josip, **O recentnim fluktuacijama naše klime.** [Recent fluctuations in climate.] *Jugoslavenska Akademija Znanosti u Umjetnosti, Zagreb, Predavanja Održana*, No. 12, **1954.** 27 p. 7 figs., 16 refs. **DLC**—Geological, archaeological, botanical and glaciological evidence is cited to show the nature and extent of climatic changes and their possible mechanisms with respect to air circulation and climate in the eastern Mediterranean. The changes in the last 30 years are emphasized. *Subject Headings:* **1. Climatic variations 2. Yugoslavia.**—*M.R.*

9.4–237 551.583.15 551.506.3

*Seamon, L. H. and Bartlett, G. S. (*both, Off. of Climatology, U. S. W. B., Wash., D. C.*), **Climatological extremes, Pt. 1.** *Weatherwise*, Boston, 9(6):193–194, 213, Dec. **1956.** fig. Also: *U. S. Weather Bureau, Weekly Weather and Crop Bulletin*, 43(9):6–8, Feb. 27, **1956. DWB, DA, DLC.** Also: [summary of Pt. 1, entitled]: **World's weather records.** *Science News Letter*, Wash., D. C., 71(2):19, Jan. 12, **1957.** photo. **DWB, DLC, DGL. Pt. 2. Climatological extremes.** *Weatherwise*, Boston, 10(2):60–61, April **1957. DWB**—A map of the world shows record means or extremes of temperature, rainfall, snowfall, wind and thunderstorm days in various parts of the world. Article in *Weatherwise* gives more details of the temperature, precipitation and snow on ground, records in the U. S., Alaska and world. Some of the data are more recent than those in the article in *Weekly Weather and Crop Bulletin* which goes into detail about fog, wind storms (tornadoes, hurricanes, thunder, lightning and hail), and pressure extremes for U. S. and Alaska as well as world. The map in *Weatherwise* was prepared by the Quartermaster Research and Development Command, Natick, Mass. In Pt. 2, extremes of fogginess, wind, sea level pressure and destructive storms in the U. S. and comparative data for Alaska, Hawaii, the British Isles, etc. are included. *Subject Headings:* **1. World climatological extremes 2. Extreme weather records 3. United States 4. Alaska 5. World.**—*M.R.*

9.4–238 551.583.3:551.311.13

†Bariss, Miklós, **Az eljegesedések okai és a Milanković-Bacsák elmélet.** [Causes of glaciation and the Milankovitch-Bacsák theory. Pt. 1.] *Földrajzi Közlemények*, Budapest, 77(3/4):205–231, **1953.** Pt. 2, *Ibid.*, 78(1):11–46, **1954.** Pt. 3, *Ibid.*, 78(2):137–152, **1954.** 12 figs., 7 tables, 65 refs. German summary for all parts, p. 150–152. **DLC** (G9 .M18)—In this very thorough study the well-known MILANKOVITCH astronomical theory of ice ages and the less generally known theories of BACSÁK (which confirm and significantly extend the conclusions of Milankovitch) are reviewed along with the scientific arguments which have been raised for and against them. Other theories of ice ages are critically examined. *Subject Headings:* **1. Ice ages 2. Milankovitch theory 3. Bacsák theory.**—*G.T.*

9.4–239 551.583.3:551.526.6

Ericson, David B.; Broecker, Wallace S.; Kulp, J. Laurence and Wollin, Goesta (*all, Lamont Geological Obs., Columbia Univ.*), **Late-pleistocene climates and deep-sea sediments.** *Science*, Wash., D. C., 124(3218):385–389, Aug. 31, **1956.** 3 figs., table, 17 refs. **DLC**—Nine correlated samples of bottom silt obtained from all parts of the Atlantic (0°–41°N) show marked changes in climate 10–15,000 yrs ago as deduced from variations in Foraminifera and other deep-sea core data, dated by radiocarbon and other methods. The warming of the waters began gradually about 13,000–12,000 yrs ago and reached its peak rate about 11,000 yrs ago—a date corresponding with retreat of the continental glacier in North America. The samples show uniformity on both sides of the Atlantic and in different latitudes indicating that changes (shown on graphs) were not due to local upheavals or factors. *Subject Headings:* **1. Climatic changes 2. Pleistocene ocean temperatures 3. N. Atlantic Ocean.**—*M.R.*

9.4–240 551.583.3:550.9:539.16:546.26

Rubin, Meyer and Suess, Hans E. (*U. S. Geological Survey, Wash., 25, D. C.*), **U. S. Geological Survey radiocarbon dates II.** *Science*, 121(3145):481–488, April 8, **1955.** 14 refs. **DWB**—Radiocarbon dates from May 1 to Oct. 1, 1954 by the U. S. G. S. give further evidence of a glacial advance on the North American continent around 20,000 years ago, and in the

mountains of the Western U. S. about 3,000 yrs ago. Dating of calcareous deep sea sediment in the Caribbean (O^{16}/O^{18} ratio) show that water temperatures were about 5°C lower than at present until about 12,000 yrs ago when they began to increase suddenly. Data are arranged according to 1) samples with oceanic implications, 2) sea level changes, 3) glacial samples, 4) archaeology. *Subject Headings:* **1. Radiocarbon dating 2. Paleotemperatures.**—*M.R.*

MICROCLIMATOLOGY

See also: **Microclimatic studies, Lindenberg** (Henning), 9.4–11; **Ships' hold climates** (Niemann), 9.4–61; **Temp. gradient-instability relationships, Austrian Alps** (Hoinkes), 9.4–155.

9.4–241 551.584:551.524.4

Dobosi, Zoltán, **Kritérium a függő mikroklíma jelenlétének megállapításához.** [A criterion for determining the presence of a dependent microclimate.] *Időjárás*, Budapest, 60(5):287–291, Sept./Oct. **1956.** figs., eqs. French summary p. 287. **DLC**—Dependent microclimate is defined as one determined not only by the heat balance of the underlying surface but also by adjacent surfaces having different heat conditions. It is shown that "independent" microclimates are characterized by a logarithmic distribution of temperature with height. Deviation from logarithmic temperature distribution is therefore suggested as a measure of the "dependence" of a microclimate. Monthly values of "dependence" are tabulated (on the basis of a 3-year period) for the microclimatological research station at Erdőhátpuszta. *Subject Headings:* **1. Microclimates 2. Vertical temperature distribution 3. Erdőhátpuszta, Hungary.**—*G.T.*

9.4–242 551.584.3

Van Eimern, Josef, **Zur Methodik der Geländeklimaaufahme.** [Technique of terrain climate mapping.] *Germany. Deutscher Wetterdienst, Mitteilungen*, 2(14):125–131, **1955.** 13 refs. **DWB**—"Geländeklima" is defined as the climate of localities constituting the smallest units of a landscape and possessing distinct, characteristics of soil climate, vegetation exposure, topography, etc. In this paper the author discusses the technique of terrain climate mapping with special reference to agrometeorology. The most suitable instrumentation, such as the meteorograph and resistance thermometers, the use of automobile traverses to estimate frost danger, evaluation of radiation absorption, distribution of minimum temperatures, etc. are discussed. *Subject Headings:* **1. Terrain climatology 2. Terrain climate mapping 3. Micrometeorological instrumentation 4. Agricultural meteorology.**—*I.L.D.*

9.4–243 551.584.61:551.524

Radulov, Št. and Ambruš, J., **Vplyv niektorých meteorologických faktorov na prirodzenú výmenu vzduchu v miestnostiach.** [Influence of certain meteorological factors on the natural air exchange in buildings.] *Meteorologické Zprávy*, Prague, 10(2):44–46, **1957.** 2 graphs, 2 refs., eq. Russian, German and English summaries p. 44. **DWB**—The effect of wind and of difference between inside and outside temperature on air exchange was measured in two closed rooms (A and B) in one of which the measurements were made both with the normal leakages around (closed) windows and doors (B_1) and with all openings completely sealed (B_2). Scatter diagrams are presented for the correlations 1) wind speed-air exchange and 2) temperature difference-air exchange in rooms A (24 series of measurement), B_1 (31 series) and B_2 (14 series). *Subject Headings:* **1. Indoor temperatures 2. Indoor air exchange.**—*G.T.*

CLIMATIC CLASSIFICATION

See also: **Orographic influences and precip., Czechoslovakia** (Rein), 9.4–192.

9.4–244 551.585:615.834

Poppinger, J. (*Vienna*), **Fremdenverkehr und Klima.** [Climate and the tourist trade.] *Wetter und Leben*, Vienna, 7(8/11):268–269, **1955.** **DLC**—The author discusses the possible contributions climatology and meteorology can make to increasing tourist trade in Austria

during off-season months—Jan. and the fall and in localities off the beaten tourist track. This involves chiefly a more thorough study of the climatic characteristics of vacation, health and winter sport resorts and publicizing their special characteristics. Some examples of this procedure are cited. *Subject Headings:* **1. Tourist climatology 2. Resort climatology 3. Austria.**—*I.L.D.*

9.4–245 551.585.7:551.588.6

Garavel, L., **La contribution de l'Administration des Eaux et Forêts à l'étude de la climatologie des Alpes.** [The contribution of the "Water and Forest Service" to the study of Alpine climatology.] *La Météorologie*, Paris, Ser. 4, No. 45/46:161–163, Jan./June **1957.** French, English and German summaries, p. 161. **DWB**—Mountains provide a particularly suitable ground for the study of the relation between the climate and the forest vegetation. The forest rangers have also to organize the struggle against torrents and avalanches, phenomena which are also the result of the climate. Therefore, since the beginning of the century, the French Water and Forest Service has made climatological observations in the Alps (meteorological and glaciological observations). Recently, it has taken the initiative in creating in Grenoble a Nivoglaciological Study and Documentation Centre (CEDONIGLA), in collaboration with the "Météorologie Nationale" and the "Electricité de France." This partnership will contribute to a better knowledge of the climatology of the French Alps. *Subject Headings:* **1. Mountain climatology 2. Forest climatology 3. French Alps.**—*Author's abstract.*

9.4–246 551.585.7:551.515:551.509.3

Jalu, R. and Pruvost, J. M. (*both, Météorologie Nationale*), **Le temps sur les Alpes.** [Weather in the Alps.] *La Météorologie*, Paris, Ser. 4, No. 45/46:23–41, Jan./June **1957.** 16 figs., 4 plates (photos). French, English and Spanish summaries, p. 23. **DWB**—This article illustrates succinctly to the general reader the physical phenomena which occur in atmospheric disturbances, and the influence of relief on the various meteorological elements. Then a concise analysis is made of some characteristic meteorological situations of the principal types of weather of the Alps. *Subject Headings:* **1. Alpine meteorology 2. Atmospheric disturbances 3. Alps.**—*Authors' abstract.*

9.4–247 551.585.7:551.582.1(437)

Konček, Mikuláš (*Directeur de l'Institut Géographique de l'Académie Slovaque des Sciences, Bratislava, Tchécoslovaquie*), **La climatologie des Hautes Tatras.** [Climatology of the High Tatras.] *La Météorologie*, Paris, Ser. 4, No. 45/46:217–219, Jan./June **1957.** 5 maps. French, English and German summaries, p. 217. **DWB**—The High Tatras, situated in the center of Central Europe, is of a high degree of continentality which is characterized by a great yearly amplitude of temperature and plenty of rainfall in summer. The rains of cyclonic origin are mainly caused by depression areas, the course of which is in the North of the Tatras, but the influence of cyclones coming from the Adria are reduced by the influence of the high mountain ranges in the South of the Tatras. As to the snow cover in winter we can note a considerable difference between the South and Southeast slopes on one side and West and North slopes on the other side. *Subject Headings:* **1. Mountain climatology 2. Climate of High Tatras 3. Tatra Mountains.**—*Author's abstract.*

9.4–248 551.585.7:551.579

Pardé, M. (*Faculté des Sciences, Grenoble, France*), **Quelques problèmes relatifs à la climatologie et à l'hydrologie des montagnes.** [Problems of mountain climatology and hydrology.] *La Météorologie*, Paris, Ser. 4, No. 45/46:231–236, Jan./June **1957.** French, English and German summaries, p. 231. **DWB**—At first, the author warns the reader against a too widely spread tendency to explain, without sufficient proof, the important river-crests occurring at certain periods, by the melting of the snow. Although he does not deny this problem by rational observation methods, he tries, in particular, to evaluate, on the one hand, the total volume of the streamflow of the rivers during their floods, on the other hand, the volume of the liquid precipitations which have caused the phenomena. Secondly, in order to improve our knowledge of alpine climatology, he underlines the necessity of establishing

precipitation maps extending over several countries including an alpine area, to include the heavy extensive showers (heavy precipitation over vast territories). Finally, the author raises an important problem which might concern the river-floods, namely that of the altitude at which the precipitation maxima occur during the "heavy extensive storms" and he suggests that research be conducted to determine it on certain slopes. This maximum seems, in fact, to be situated at a level which is noticeably lower than that of the highest annual totals. *Subject Headings:* **1. Mountain climatology 2. Hydrological climatology 3. Stream flow 4. Floods.**—*Author's abstract.*

BIOCLIMATOLOGY

See: **Irrigation effects on crops** (Rudnev), 9.4–52.

ENVIRONMENTAL INFLUENCES

See also: **Forest influences** (U. S. Forest Serv.), 9.4–54; **Forest temp. and precip.** (Baumgartner), 9.4–55; **Diffuse radiation on oriented slopes** (Kondrat'ev, Manolova), 9.4–142; **Evapotranspiration and vegetation effects, S. Africa** (Rycroft), 9.4–178; **Vertical precip. measurements** (Rein), 9.4–193; **Alpine climatology** (Garavel), 9.4–245.

9.4–249 551.588.6

Chebataroff, Jorge, **Influencia del tapiz vegetal sobre el clima.** [Influence of the plant cover on the climate.] *Revista Meteorológica*, Montevideo, 5(17):41–56, Jan. **1946.** 3 photos. **DWB**—A purely descriptive and general discussion of the effect of the plant cover on climate, its influence upon light, atmospheric temperature, absorption, humidity, precipitation and wind. *Subject Heading:* **1. Vegetation influences.**—*I.L.D.*

9.4–250 551.588.7:551.582

†Landsberg, Helmut E., **The climate of towns.** (In: International Symposium on Man's Role in Changing the Face of the Earth, Princeton, N. J., June 1955, **[Proceedings],** ed. by W. L. Thomas, Jr. Univ. of Chicago Press, **1956.** p. 584–606. 5 figs., 16 tables, bibliog. p. 603–606.) **DLC**—After a brief historical survey of early studies on the effects of towns on their climate and the characteristics of town climates, the author examines in detail the influence of man-made changes in towns upon the individual meteorological variables. Numerical data, graphs and discussions cover air constituents, atmospheric radiation, visual range, total precipitation, snowfall and atmospheric temperatures and humidity. *Subject Headings:* **1. Urban climates 2. Urban influences.**—*I.L.D.*

SYNOPTIC CLIMATOLOGY

See also: **Weather classification** (Caděz), 9.4–101; **Weather classification** (Mertz), 9.4–102; **Weather classification** (Schuepp), 9.4–103.

9.4–251 551.589

†Hare, F. Kenneth (*McGill Univ., Montreal*), **The dynamic aspects of climatology.** *World Meteorological Organization. Commission for Climatology, 2nd, Wash., D. C., Jan. 1957, Papers*, CCl-II/SP.2, Jan. 14, **1957.** 25 p. 57 refs., 6 eqs. **DWB** (M06 W927cm CCl:1957)—The purpose of this extensive review of dynamic and synoptic climatology is to compare various existing definitions of the field (with particular attention to distinguishing it from the fields of dynamic or physical meteorology), to assess work done in the past and to suggest development for the future. The descriptive aspects of dynamic climatology are treated in sections on the mean pressure map, the mean streamline map, component circulations (flow patterns, airmass climatology, pressure field anatomy) and quantitative methods of field description. Applications by T. F. MALONE and his associates (M.I.T. and Travelers Weather Research Center) and by HARE and associates (McGill Univ.) are discussed. Examining the explanatory aspects of dynamic climatology, the author believes that "progress will be made via the use of derived elements such as vertical vorticity, divergence and thickness, rather than via the use of direct measures of velocity, pressure gradient and temperature." *Subject Headings:* **1. Dynamic climatology 2. Synoptic climatology.**—*G.T.*

MISCELLANEOUS

SOLAR INFLUENCES

See also: **Corpuscular radiation and geomag. disturbances** (Pecker, Roberts), 9.4–150; **Aurora borealis, Greece** (Karapiperis), 9.4–275.

9.4–252 551.590.24:551.510.535:551.594.13

Burkard, Otto (*Institut f. Met. und Geophysik, Graz Univ.*), **Temperature-controlled variations of the ionosphere during an eclipse.** (In: **Solar eclipses and the ionosphere: a symposium** . . . ed. by W. J. G. Beynon and G. M. Brown. London, Pergamon, **1956.** p. 69–73. 4 figs., 2 eqs.) **DWB**—Hitherto the changes in f_0E and F_0F1 in an eclipse have been explained by the relation

$$\frac{dN}{dt} = D.q_0 \cos \chi - \alpha' N^2,$$

where D is the fraction of unobscured sun's disk and α' a constant. But now we know that the diurnal variation of f_0E is approximately proportional to $\cos^{\frac{1}{2}} \chi$, and for f_0F1 the diurnal variation is represented by $f_0F1\alpha \cos^m \chi$, where the values of m change approximately between 0.15 and 0.28. Such a variation can be explained by the assumption that there is a linear increase of temperature with height and a recombination coefficient $\alpha' = \alpha'_0 \cdot p^k \cdot T^n$ (p = pressure; $k_1 n$ = indeterminate constants). An attempt to explain the changes in electron density at Khartoum during the eclipse of Feb. 25, 1952 has shown that, using the same relations, there is no necessity to assume any nonuniform distribution of the sources on the sun's disk as calculated by Minnis. It is necessary to neglect the term dN/dt, but this may be a smaller error than to calculate with a constant recombination coefficient (i.e., constant temperature). The term dN/dt can be neglected in the diurnal changes in f_0E and f_0F1. The temperature at the height of maximum electron density decreases shortly after the beginning of the eclipse, and increases rapidly after the eclipse maximum. *Subject Headings:* **1. Ionospheric electron density 2. Eclipse temperature drop 3. f_0F1 variations.**—*Author's abstract.*

9.4–253 551.590.24:551.510.535

Gossner, Simone D. (*U. S. Naval Obs., Wash., D. C.*), **The ionospheric eclipse of Oct. 23, 1957.** (In: **Solar eclipses and the ionosphere: a symposium** . . . ed. by W. J. G. Beynon and G. M. Brown. London, Pergamon, **1956.** p. 275–278. figs., 2 tables.) **DWB**—Unusual geometric conditions, arising from the fact that the axis of umbra will pass very near the surface of the earth without actually touching it, are discussed for the eclipse of 23 October 1957. The axis of umbra will intersect each ionospheric layer twice at every instant, and the central lines so generated are computed for various heights. *Subject Headings:* **1. Solar eclipse, Oct. 1957 2. Eclipse effects on ionosphere.**—*Author's abstract.*

9.4–254 551.590.24:551.510.535:551.521.1

Minnis, C. M. (*Radio Res. Station, Slough*), **Origin of the E- and F1-layer ionizing radiation.** (In: **Solar eclipses and the ionosphere: a symposium** . . . ed. by W. J. G. Beynon and G. M. Brown. London, Pergamon, **1956.** p. 158–163. 4 figs., table, 7 refs.) **DWB**—The evidence obtained during earlier eclipses has tended to show that the eclipse-changes in the E and F1 layers cannot, in general, be accounted for in terms of a uniformly bright solar disk. The data, however, did not permit any reliable conclusions to be reached regarding the identity of the emission areas. During the Feb. 1952 eclipse, the results obtained by the British expeditions to the Sudan and Nigeria allowed the locations and relative intensities of the radiation sources to be determined fairly accurately. The two sets of data are in good agreement and show that only two-thirds of the radiation on that occasion was emitted uniformly from the disk. The additional sources appeared to be associated with areas in which green coronal emission was known to be strong at the time. The July 1954 eclipse occurred when solar activity was exceptionally low, but the measurements made both at Inverness and Slough show that nearly 10 percent of the radiation came from sources other than the uniform disk. The accurate location of this residual radiation was not possible, but the best fit with the

experimental data was obtained by postulating limb-brightening near the equator and limb darkening near the poles. A preliminary analysis of the E-layer data obtained during the June 1955 eclipse at Singapore shows that the distribution of the sources of ionizing radiation was not uniform, but the maximum obscuration was too small to allow much information to be gained about their locations. *Subject Headings:* **1. Eclipse effects on solar radiation 2. Solar radiation 3. Radiation measurements during eclipse.**—*Author's abstract.*

9.4–255 551.590.24:551.510.533

Muo, Chi-Hua (*Inst. of Geophy. and Met., Academia Sinica*), **On the relations between solar eclipse and ionospheric layers.** *Acta Geophysica Sinica*, Peking, 3(1):9–21, **1954.** 1 figs., 19 refs., 7 eqs. In Chinese; English summary p. 21.—Analysis of eclipse records for 1944–53 shows that during a solar eclipse the ion density in the E-layer decreases by 20%–70%, in the F1 layer by 30–80% and in the F2 layer by 10–60%. The true height, in each layer, is lowered but the lowest apparent height raised, due to the decrease in layer thickness. The resultant coefficients are of the order of 10^{-8} for E layer, 10^{-9} for F1 and 10^{-10} for F2 layers. It is concluded that the ionization energy is mainly derived from the UV radiation from the sun and these are more intense in the corona and in the prominences. The eclipse effect on the sporadic E and other layers is also discussed. *Subject Headings:* **1. Eclipse effects on ionosphere 2. Ion density.**—*From author's abstract and M.R.*

9.4–256 551.590.24:551.594

Norinder, Harald and Siksna, Reinhards, **Atmospheric-electric elements measured at Uppsala during the solar eclipse of June 30, 1954.** *Arkiv för Geofysik*, Stockholm, 2(19):417–421, **1957.** fig., 14 refs. **DLC**—The variation of potential gradient, condensation nuclei, small ions, air temperature, relative humidity, computed conductivity and air-earth current during the eclipse is shown in graphical form. No direct influence of the solar eclipse was noted, but some possible secondary effects are described. *Subject Headings:* **1. Solar eclipse, June 1954. 2. Atmospheric electricity.**—*A.A.*

9.4–257 551.590.24:551.510.535:551.510.62

Rastogi, R. G.; Sheriff, R. M. and Nanda, N. G. (*all, Physical Res. Lab., Ahmedabad*), **Some measurements of the signal strengths of radio waves reflected from the ionosphere during the solar eclipses of June 30, 1954 and June 20, 1955.** (In: **Solar eclipses and the ionosphere: a symposium** . . . ed. by W. J. G. Beynon and G. M. Brown. London, Pergamon, **1956.** p. 137–142. 7 figs., ref.) **DWB**—The signal strengths of radio waves from B.B.C. transmissions on 15-07 Mc/s were measured at Ahmedabad during the 1954 eclipse, with control observations on a few preceding and succeeding days. The signals, which could have been either by two-hop of three-hop reflections, showed well-marked increases in intensity during the eclipse. The increase of signal strength is considered to be due to a decrease of attenuation in the *F*1 layer. Similar measurements were carried out for the 1955 eclipse at Trivandrum, on the radio transmission from Colombo 4.87 Mc/s directed skyward, and at Ahmedabad 7.19 Mc/s. Here again the signals showed well-marked increases of strength during the eclipse. In both cases the signal intensity returned to its normal value well before the end of the eclipse. The reflections observed at Trivandrum could have been from *F*1, if there was an *F*1 layer. Near the geomagnetic equator, however, *F*1 is not usually observable at this hour of the day. Probably the reflection took place from *F*2, with decrease of attenuation mainly in *F*1. The reflections observed at Ahmedabad should have been from *E*, and the decrease of attenuation during the eclipse should have taken place below *E*. *Subject Headings:* **1. Solar eclipse, June 1954 2. Eclipse effects on ionospheric reflection 3. Solar eclipse, June 1955 4. Ionospheric layers 5. Ahmadabad, India 6. Trivandrum, India.**—*Authors' abstract.*

9.4–258 551.590.24:551.510.535

Rawer, Karl (*Service de Prévision Ionosphérique Militaire, Freiburg*), **Critical survey of eclipse information on recombination data.** (In: **Solar eclipses and the ionosphere: a symposium** . . . ed. by W. J. G. Beynon and G. M. Brown. London, Pergamon, **1956.** p. 198–203. 5 figs., 12 refs., 2 eqs.) **DWB**—The more important assumptions underlying the

analysis of ionospheric eclipse measurements are critically examined and proposals made for future work in this field. *Subject Headings:* **1. Ionospheric recombinations 2. Eclipse effects on ionosphere.**—*Author's abstract.*

9.4–259 551.590.24:551.510.535:551.510.62

Weekes, K. (*Cavendish Lab., Cambridge*), **Some observations of the lower ionosphere during the solar eclipse of June 30, 1954.** (In: **Solar eclipses and the ionosphere: a symposium** . . . ed. by W. J. G. Beynon and G. M. Brown. London, Pergamon, **1956.** p. 116–123. 3 figs., 3 tables, 6 refs.) **DWB**—Amplitude and phase measurements were made on long and medium waves during the eclipse of 30 June 1954 at vertical and oblique incidence. The midpoints of the oblique trajectories responded in general to 75–90 percent obscurity. Changes in reflection height were usually observed, and considerable increases in the reflection coefficient for the larger observations. *Subject Headings:* **1. Eclipse effects on ionosphere 2. Solar eclipse, June 1954 3. Ionospheric radio wave reflection.**—*Author's abstract.*

VISIBILITY

9.4–260 551.591:535.6

Chapanis, Alphonse and Halsey, Rita M. (*Johns Hopkins Univ.*), **Luminance of equally bright colors.** *Optical Society of America, Journal,* 45(1):1–6, Jan. **1955.** 2 figs., 2 tables, 5 refs. **DWB**—An analysis has been made of the Y values, or luminances, of 342 colored filters which had been previously matched in brightness by direct visual comparison. The CIE diagram was partitioned into 20 zones and the average luminance calculated for the colors in each zone. The results show regular shifts in the average luminance values over the CIE diagram. Supplementary experiments support the principal findings. In general, the data agree with other recent studies which show that, for colors of equal brightness, saturated colors require less luminance than desaturated ones. However, there is a reversal of this trend in the yellow area since the point of maximum luminance for a given brightness occurs there. The latter finding agrees closely with recent predictions by MacAdam based on his model of visually homogeneous color space. *Subject Headings:* **1. Luminance 2. Color contrast.**—*Author's abstract.*

9.4–261 551.591:612

Mote, F. A. (*Univ. of Wisconsin*), **Variability of measurements of human dark adaptation.** *Optical Society of America, Journal,* 45(1):7–12, Jan. **1955.** 6 figs., 6 refs. **DWB**—Data on the dark adaptation of three subjects were gathered. All were given the same pre-exposure and testing conditions and threshold measurements taken for 40 min at each experimental session. Each subject served in 12 sessions spread over a period of 11 months, and two dark adaptation curves were obtained at each session. The effect of obtaining two curves per session, morning *versus* afternoon conduct of the sessions, and of changing experiments was investigated, and except for one minor difference, no statistically significant effect was found to result from these factors. The data showed that the variability of threshold measurements changed during the course of 40 min dark adaptation. It began at a given value and declined in magnitude toward the end of cone adaptation. At the time of the cone-rod transition the variability of two of the subjects showed a marked increase and it remained at a relatively high level for several minutes, gradually becoming smaller. After about 20 min the variability reached a minimum, stable value and stayed around this value for the remainder of dark adaptation. An explanation is offered to account for this result. Another result was that the magnitude of the variability showed inconsistent changes during the progress of the experiment, brought about by aberrant curves that were obtained from time to time. There seems to be no ready explanation of the occurrence of such curves. *Subject Headings:* **1. Dark adaptation 2. Contrast threshold 3. Visibility measurements.**—*Author's abstract.*

9.4–262 551.591:551.509.5:551.578

Poliakova, E. A., **Dal'nost' vidimosti v zone dozhdia.** [Range of visibility in an area of rain.] *Meteorologiia i Gidrologiia,* Moscow, No. 8:23–26, Aug. **1956.** fig., table, 3 refs., 12 eqs. **DWB, DLC**—This paper is concerned with determining the transparency of the

atmosphere during rain and forecasting visibility during rain. The author examines th possibility of determining the transparency of air within a rainfall area from a given rai intensity and develops equations expressing the relationship. An expression is developed fo determining the distance of visibility in a rain zone in terms of points on a scale. *Subjec Headings:* **1. Visibility in rain 2. Visibility forecasting.**—*I.L.D.*

OPTICAL PHENOMENA

See also: **Turbidity and precipitable water measurement** (Schüepp), 9.4–16.

9.4–263 551.593..

†Deirmendjian, Diran, **Atmospheric scattering of light and the sun's aureole.** California Univ. at L. A. Dept. of Meteorology. Contract AF 19(604)-1303, Scientific Report No. 1 Sept. **1956.** 79 p. 9 figs., tables, 41 refs., numerous eqs. **DWB**—Study of the sky brightnes near the sun's disc on clear days (sun's aureole) gives a clue to the amount of atmospheri turbidity and can be used in detecting invisible clouds of fine particles originating in thermo nuclear explosions. The theory of scattering on a single sphere, on spheres of various sizes radiative transfer in the turbid atmosphere and application to the sun's aureole. Polarization relative amount of light scattered forward with changing particle size (the larger the particle the more light is scattered forward) and other recent refinements of the Rayleigh and Mi solutions are incorporated. *Subject Headings:* **1. Sun's aureole 2. Scattering 3. Turbidity** —*M.R.*

9.4–264 551.593.5

O zelenom luche. [Green flash.] *Priroda*, Moscow, 46(1):127–128, Jan. **1957. DWB DLC**—A series of comments from readers discussing the probability of mistakes in observing the green flash or similar optical phenomena at sunset. *Subject Headings:* **1. Green flash 2. Optical phenomena.**—*A.A.*

9.4–265 551.593.55

Friedrich, W. (*Vienna*), **Praktische Studien zum Dämmerungsproblem.** [Practica studies on the twilight problem.] *Wetter und Leben*, Vienna, 7(8/11):202, **1955. DLC**—Thi note which describes briefly studies carried out by the author on the effect of civil twilight upon street traffic and other daily events, upon the results which were published in supplemen 9 of Jahrbuch 1950 der Zentralanstalt für Meteorologie und Geodynamik. *Subject Heading* **1. Twilight effects on human activity.**—*I.L.D.*

9.4–266 551.593.63

Lunar halo [in] West African Waters [and] Bay of Bengal. *Marine Observer*, 27(177) 144–145, July **1957. DLC**—1) Sept. 25, 1956, 5°6′N, 10°56′W, Van Buijsen's halo, inner edge 9° radius, 1½° wide 2) July 15, 1956, 8°20′N, 82°40′E, a narrow well-defined halo of 24 radius. *Subject Heading:* **1. Halo observations.**—*C.E.P.B.*

9.4–267 551.593.7:551.508.93

Cialdea, R., **Un néphoscope photographique pour la polarisation de la lumière du ciel** [Photographic nephoscope for the polarization of sky light.] *I.U.G.G. Association of Meteorology, Rome, Sept. 1954, Scientific Proceedings.* London, Butterworth, **1956.** p. 538–539. 3 photos. **DWB**—A method for determining the polarization of the light of the sky is based upon the measurement of the intensity of the light diffused by a certain region of the sky, filtered by a nicol prism of which the surface of polarization forms three different angles with a fixed surface. The equations giving the total intensity of diffuse light and the fraction of polarized light are presented. The photographic nephoscope described with the aid o photographs measures the intensity by photographing the image of the entire vault of the sky reflected in a convex metal surface. The disadvantages as well as the advantages of this device are discussed. *Subject Heading:* **1. Polarimetry.**—*I.L.D.*

ELECTRICAL PHENOMENA

See also: **E layer electron density** (Lepechinsky), 9.4–119; **Types of solid precip., Italy** (Barla), 9.4–200; **F_0F1 variations during eclipses** (Burkard), 9.4–252; **Eclipses and atmos. electricity** (Norinder), 9.4–256; **Eclipse effects, June 1954 and 1955** (Rastogi et al.), 9.4–257; **Solar eclipse, June 1954** (Weekes), 9.4–259.

9.4–268 551.594

Franklin, Benjamin, **Farther experiments and observations in electricity.** *Science*, Wash., D. C., 123(3185):47–50, Jan. 13, **1956.** 11 refs. **DLC**—Reproduction of Letter 4 from his book, **Experiments and observations on electricity,** first pub. London, E. Cave, **1751.** This text is from Cambridge, Mass., Harvard Univ. Press, 1941 edition, ed. by I. B. COHEN—Observations made with great care and detail on electric charges and their behavior in the air and in the ground, even dry ground, though dry earth or ice will not conduct electricity in the laboratory. He observed that the gilt on a bound book would conduct until it had been tried 10–12 times and then it quit conducting. *Subject Headings:* **1. Atmospheric electricity 2. Franklin's experiments.**—*M.R.*

9.4–269 551.594.11:551.577

*Dvali, E. R., **Elektricheskoe pole atmosfery pri osadkakh.** [The electrical field of the atmosphere during precipitation.] *Leningrad. Glavnaia Geofizicheskaia Observatoriia, Trudy*, 58(120):69–74, **1956.** 3 refs., 4 tables, 3 figs. **DLC**—The results of a study on the electric potential gradient of the atmosphere during precipitation (both solid and liquid), based upon measurements with a radioactive collector and an electrograph over a period of six years at the Thelissi Geophysical Observatory. Data are presented on the mean daily variation of electric potential gradient on days with snowfall and on days with heavy showers. *Subject Heading:* **1. Atmospheric potential gradient during precipitation.**—*I.L.D.*

9.4–270 551.594.12:551.510.535

Mariani, F., **Sulla diffusione degli elettroni nella ionosfera.** [Diffusion of electrons in the ionosphere.] *Annali di Geofisica*, Rome, 9(2):219–231, April **1956.** 5 figs., tables, 6 refs., 21 eqs. Italian and English summaries p. 230. **DLC**—The theoretical aspects of ion or electron diffusion and density in a non-isothermal ionosphere are developed for the simple case of a temperature inversion and the more complicated case of a constant lapse. Assuming that the atmosphere is composed of both ion-electrons and molecules of gas, that the temperature gradients are uniform with height, the nights and days are equal (at the equator), the thermal diffusion effect in a geomagnetic field was found to be negligible for the E and F1 layer and are small even for the F2 layer and hence would merely amount to a perturbative effect. *Subject Headings:* **1. Ionospheric electron diffusion 2. Thermal diffusion of ionospheric electrons.**—*M.R.*

9.4–271 551.594.22:550.37

Fritsch, Volker, **Zur Frage der geoelektrischen Blitzgefährdung.** [The problem of geoelectric lightning danger "nests."] *Geofisica Pura e Applicata*, Milan, 35:149–160, Sept./Dec. **1956.** 6 figs., 4 tables, 10 refs. English summary p. 149. **DLC**—The author investigates the problem whether certain places of the ground are especially often struck by lightning and whether this effect is due to geoelectric properties of the subsoil. By examining a great number of results obtained in Austria the author concludes that the existence of "lightning nests" can be affirmed. *Subject Headings:* **1. Geoelectric lightning "nests" 2. Lightning attraction.**—*Author's abstract.*

9.4–272 551.594.22

Visser, S. W., **Some remarks on lightning flashes and ball lightning.** *Meteorological Magazine*, London, 86(1025):344–347, Nov. **1957.** fig., 3 refs. **DWB**—Generation of electricity during downdraughts in thunderstorms after updraughts have ceased must be greater than in updraughts. Ball lightning is real and due to rapid cooling of a mixture of electrically positive and negative gases; two cases in Holland are described. *Subject Headings:* **1. Lightning flashes 2. Ball lightning.**—*C.E.P.B.*

9.4–273 551.594.25:551.578.1

Krasnogorskaia, N. V. (*Geophysical Inst., Academy of Sciences, U.S.S.R.*), **Rezul'taty izmereniia zariadov chastits osadkov v svobodnoĭ atmosfere.** [Results of measurements of charges on precipitation particles in the free atmosphere.] *Akademiia Nauk SSSR, Izvestiia, Ser. Geofiz.*, No. 7:844–852, July **1956.** 5 figs. (graphs), 5 tables, 2 eqs. **DLC**—Measurements of the charges on rain particles in the free atmosphere and on charges on rain and cloud particles obtained by airplane flights. Precipitation charges were measured with an induction coil. In the case of the free atmosphere, a droplet measure was carefully graduated in a charged instrument shelter insulated from the earth and tests were made of the distortions which might be introduced during measurement of shattered droplets during entrance into the drop measurer. The charge acquired by the airplane during flight was measured by a dynamic field measurer. Data are presented on the variation of the charge of the airplane in a cumulus cloud at 2000 m and in a torrential rain at 100 m and on the spectrum of the distribution of droplets in cumulus clouds by charges, the number of positive and negative droplets measured, mean value of charge in a droplet and ratio of total negative to total positive charge, etc. It was found that in the free atmosphere negatively charged raindrops predominate; their charge is on the average greater than that of the positively charged. The sign of the charge of the airplane as a rule corresponds with the sign of the total charge of the measured rainfall and the charge of raindrops obtained in the free atmosphere during torrential rain is greater than the charge of raindrops at the earth's surface. *Subject Heading:* **1. Electrical charges on raindrops.** —*I.L.D.*

AURORAS

9.4–274 551.594.5 550.385

Åström, Ernst (*Royal Inst. of Tech., Stockholm*), **On the theory of magnetic storms and aurorae.** *Tellus*, Stockholm, 8(2):239–240, May **1956.** ref., 17 eqs. **DLC**—The drift motion of the ionized gas from the sun can be divided into three terms, namely: (1) one resulting from crossed electric and magnetic fields, one from the inhomogeneity of the magnetic field and one from the inertia of the charged particles. "In the region where the magnetic field from the sun and earth is the same order of magnitude, the current due to drift in crossed fields and that due to inertia form a circular current round the earth." A mathematic proof of this statement, made by H. Alfvén is presented. *Subject Headings:* **1. Magnetic storms and auroras 2. Auroral theories.**—*I.L.D.*

9.4–275 551.594.5:551.590.21

Karapiperis, Leon N. (*Univ. of Athens, Greece*), **Some appearances of the aurora borealis in Greece.** *Geofisica Pura e Applicata*, Milan, 35:139–142, Sept./Dec. **1956.** 17 refs. **DLC**—Historic and recent observations of auroras show that this phenomenon is not exceptionally rare in Greece. The appearances coincide with the years of maximum solar activity and especially 1–2 years after it, while in the years of minimum solar activity or near these years no auroras were observed. All auroras, with the exception of two, were observed in or around spring and autumn. The most southern point at which auroras were observed in Greece is at 35°N lat. *Subject Headings:* **1. Auroral observations 2. Auroral-solar relationships 3. Greece.**—*Author's abstract.*

9.4–276 551.594.5 551.521.326

Lange-Hesse, G., **Das Internationale Geophysikalische Jahr, XII: Polarlicht und Nachthimmelsleuchten.** [The I.G.Y., Pt. 7, Aurora and night sky light.] *Umschau*, 57(23):707–709, 1 Dec. **1957.** 4 figs., footnote refs. **DLC**—There is a permanent weak light source round the earth, and a much stronger occasional ring of light 22–24° from the magnetic pole. This is the aurora. The cause of the night sky light is the ionization and dissociation of gases by UV sunlight at great heights, that of aurora corpuscular rays from the sun focused by the geomagnetic field. The I.G.Y. program for world-wide study of aurora is set out, including tropics and radio waves, and especially German contributions to observation of aurora and night sky light. *Subject Headings:* **1. Auroras 2. Night airglow.**—*C.E.P.B.*

9.4–277 551.594.5

Polanyi, J. C. (*The James Forrestal Res. Center, Princeton Univ., N. J.*), **A theoretical discussion of the conditions necessary for chemiluminescence.** (In: **The airglow and the aurorae: a symposium.** London, Pergamon, **1956.** p. 346–350. 2 refs., eqs.) **DWB**—The conditions necessary for chemiluminescence are discussed for an atomic reaction $A+BC \rightarrow AB+C$. A method is outlined by which it should be possible to calculate the expected light-yield for a reaction of this type. The method consists in the calculation of the total probability that the reaction will take place with BC extended to $\geqslant r^*_{BC}$ a critical separation corresponding to a repulsive energy between AB and $C < (\diagdown\Delta H\diagup - N_0 h\nu)$, where ν is the minimum frequency of the emitted light and ΔH is the heat of reaction. A preliminary calculation indicates that the method will predict absolute light-yields in satisfactory agreement with the observed values for the reactions $Na+XHg \rightarrow NaX+Hg$ (X = Cl,Br,I). *Subject Heading:* **1. Chemiluminescence.**—*Author's abstract.*

9.4–278 551.594.5:550.385

Singer, S. Fred (*Dept. of Physics, Maryland Univ.*), **A new model of magnetic storms and aurorae.** *American Geophysical Union, Transactions,* 38(2):175–190, April **1957.** 14 figs., 3 tables, 30 refs., eqs. **DWB, DLC.** Also issued as Maryland Univ. Physics Dept., Contract AF 18(600)-1038, Technical Report No. 48, July **1956.** 20 p. 14 figs., 3 tables in appendices. **DWB**—A new model for explaining S.C.'s (sudden commencements), magnetic storms and the aurora is developed and presented in a lucid manner. Other models are reviewed (Chapman, Ferraro and Alfvén), observational evidence discussed and the pre-S.C. bays attributed to high-velocity particles preceding the shock waves following 22–34 hours after a solar eruption. The shock wave is retarded by the geomagnetic field, but accelerates as it enters the auroral zone and produces polar S.C.'s. The decrease in the storm is due to high-velocity particles following up to 9 hours after the shock wave. The shock wave may help accelerate auroral particles. *Subject Headings:* **1. Sudden commencements 2. Magnetic storms 3. Magnetic storms and auroras.**—*M.R.*

9.4–279 551.594.51:535.33:537.5

†Brook, Marx, **New studies of nitrogen afterglows.** California. Univ. Institute of Geophysics, Contract AF L9(122)-453, Scientific Report, No. 2, March **1953.** 66 p. 5 tables, 11 figs., 43 refs., eqs. **DWB**—A flow system is used to mix the long lived nitrogen afterglow with helium and argon after the glowing gas emerges from the discharge. Large intensity modifications in the first positive afterglow bands are produced, similar to those found by mixing nitrogen with a rare gas prior to the discharge. This result leads to the conclusion that the afterglow is an atomic recombination process via the repulsive $^5\Sigma$ state. The theory of Cario and Reinecke is slightly modified to account for a three body collision process. Some new nitrogen afterglow bands are present in the photographic infrared. Several of these do not belong to the first positive group and remain unassigned. *Subject Headings:* **1. Nitrogen bands 2. Electric afterglow.**—*Author's abstract.*

9.4–280 551.594.51:550.38

Ferraro, V. C. A. (*London Univ.*), **Théories des orages magnétiques et des aurores.** [Theories concerning magnetic storms and auroras.] *Ciel et Terre,* 70(9/10):345–356, Sept./Oct. **1954.** figs. **DLC**—Early history and modern concepts of geomagnetism, solar activity, magnetic storms and auroras are reviewed in a popular article, based on accurate observations and the author's theories. *Subject Headings:* **1. Magnetic storms and auroras 2. Auroral theories.**—*M.R.*

SFERICS AND RADIO METEOROLOGY

9.4–281 551.594.6

†Dinger, Harold E. (*Naval Research Lab., Communication Branch, Radio Div.*), **Whistling atmospherics.** *U. S. Naval Research Laboratory NRL Report* 4825, Sept. 14, **1956.** 37 p. numerous figs., 20 refs., 2 eqs. Price, $1.25. **DWB**—Since 1953 NRL has been observing and recording audio-frequency atmospherics and their correlation with other geophysical phenomena. Beginning in April 1955, the diurnal variation in both whistler activity and the

occurrence of "dawn chorus" has been determined. Whistler coincidence at several location has been recorded in an attempt to prove L. R. O. STOREY's theory on the mode of propagation of these atmospherics. Many whistlers of unusual character have been spectro-analyzed for the purpose of extending present theory to cover the general case. Plans have been formulated for synoptic observations at a number of selected locations during the International Geophysical Year. *Subject Headings:* **1. Whistling atmospherics 2. Sferics.**—*Author's abstract.*

9.4–282 551.594.0

Iwai, Akira and Outsu, Jinsuke, **On an investigation of whistling atmospherics in Japan.** *Nagoya. Univ. Research Institute of Atmospherics, Proceedings*, 4:29–47, Dec. **1956.** 17 figs., 3 tables, 9 refs., eqs. **DWB**—As part of the Study Program of I.G.Y., we have prepared an observation of whistling atmospherics. Since Jan. 1956, continuous observations of whistlers have been made at Toyokawa (geomagnetic latitude 24.5°). Simultaneous observations at Toyokawa and Wakkanai (geomagnetic latitude 35.3°) were made for one month beginning 13 July 1956. The results obtained in the analysis of the dispersion of whistlers were essentially similar to those reported by Storey. But, at Toyokawa, long whistlers, whistler trains and whistler pairs have not been observed, only short whistlers being observed. The greater part of the observed whistlers occurred in winter; in other seasons it was scarcely possible to detect them. At Wakkanai, long whistlers and whistler pairs have been observed this summer, but whistler trains have not been observed during this period. *Subject Headings:* **1. Whistling atmospherics 2. Sferics 3. Japan.**—*Authors' abstract.*

9.4–283 551.594.6:621.396.663:535.4

Outsu, Jinsuke and Shiga, T., **Calculation of interference error on a crossed-loop type C.R.D.F.** *Nagoya, Japan. University. Research Institute of Atmospherics, Proceedings*, 3:63–68, Nov. **1955.** 2 refs., 12 eqs. **DWB**—This paper describes the evaluation of interference error on a crossed-loop type cathode ray direction finder. First, an expression of interference error is obtained as a function of amplitude ratio, phase difference and relative direction between the interfering atmospherics and the observed atmospherics. Next, the mean-square error for a given amplitude ratio is computed assuming that the interfering atmospherics have random phase and bearing relative to the one under observation. And finally, the mean-square error and the probability of the mean-square error for the observed atmospherics are calculated either from the amplitude-occurrence distribution of atmospherics and the bandwidth of the amplifier or from the time rate of atmospheric noise and the bandwidth. *Subject Headings:* **1. Cathode ray direction finders 2. Sferics.**—*Authors' abstract.*

9.4–284 551.594.7:621.396.11

Bai, C. Lakshmi, **Application of the generalized magneto-ionic theory to the propagation of radio waves at the magnetic dip-poles of the earth.** *Journal of Atmospheric and Terrestrial Physics*, 11(1):31–35, **1957.** 2 figs., 8 refs., 8 eqs. **DWB**—The generalized magneto-ionic theory of BOOKER is applied to the propagation of radio waves at the magnetic dip-poles of the earth, to obtain rigorous values for the levels of reflection in the ionosphere, of the magneto-ionic components. The propagation is discussed for various angles of incidence and for operating frequencies greater and less than the magneto-ionic frequency. The application of these results for finding out the maximum usable frequency for a given transmission distance at the magnetic dip-poles is indicated. *Subject Headings:* **1. Magneto-ionic theory 2. Radio wave propagation.**—*Author's abstract.*

ACOUSTICAL PHENOMENA

9.4–285 551.596.5

Doroshenko, F. D., **O raskatakh groma.** [Thunder peal.] *Meteorologiia i Gidrologiia*, Moscow, No. 8:32, Aug. **1956. DWB, DLC**—An attempt is made to explain more adequately the rolling of thunder following the first peal. Reflection of the sound from the clouds cannot explain why the rolls may be louder than the initial thunder clap. The author suggests that

since the length of the lightning stroke may range from several hundred meters to several kilometers it is natural that the sound from the various parts of the stroke cannot reach the observer at the same time. This may explain the fact that the sound of thunder is a multiple sound. *Subject Headings:* **1. Audibility of thunder 2. Thunder peals.**—*I.L.D.*

9.4–286 551.596.5

Zamorskii, A. D.,**Grom pri iasnom nebe.** [Thunder during a clear sky.] *Meteorologiia i Gidrologiia*, Leningrad, No. 6:37–38, Nov./Dec. **1955. DWB, DLC**—In connection with a distant thunderstorm, a deafening thunder without any peals or lightning was heard in Leningrad on July 12, 1954 at 20 hours (Moscow time) on a sunny day with clear sky near the zenith. A description of the clouds before, during and after the occurrence of this phenomenon is described in detail. The distance of possible lightning was estimated at 500 meters but the height of rain clouds in part of the sky was approximately 5 km. Simultaneous weather observations of the Leningrad weather station are given. An analysis of the cloud front and rain conditions leads to the conclusion that the thunder was of distant origin. *Subject Headings:* **1. Clear sky thunder 2. Distant thunderstorms 3. Leningrad, U.S.S.R.**—*I.L.D.*

PART II. RECENT LITERATURE ON WAVES, CURRENTS AND SWELL

Compiled by: *Mary L. Rice*

INTRODUCTION

This compilation of abstracts of recent oceanographic literature on wave, current and swell research has been chosen from a large accumulation of material on these and other aspects of oceanography in our growing backlog of unpublished abstracts.

Further references to material on these subjects may be found by consulting previous bibliographies and Current Abstracts on oceanographic meteorology published in *MAB:* e.g., **Marine meteorology and climatology of the Pacific** (Sept. 1953); **General oceanographic meteorology** (Jan. 1954), **Wind waves and swell** (Nov. 1954) **and Storm surges** (March 1955), as well as the items in parentheses in the following subject outline. This outline constitutes a cumulative index for the 1950–1957 issues of **Meteorological Abstracts and Bibliography.**

As evidenced by this outline, the emphasis is on the dynamics of waves, currents, swell and tides and sea level changes produced by crustal movements.

Not all recent literature in this field, especially the enormous output of the Japanese oceanographical research organizations, has been included here. A similar compilation on other phases of physical (and chemical) oceanography, e.g., salinity, temperature, optics, acoustics, polarization, turbidity, phosphorescence, etc. will appear in the May 1958 issue of *MAB.* It is hoped that these two compilations will give a fair perspective of recent oceanographic work throughout the world.

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1946–1949

9D–1 551.556:551.465

Shtokman, V. B., **Nabluidaemye osobennosti pribrezhnoĭ tsirkuliatsii v more i ikh sviaz' s poperechnoĭ neravnomernost'iu vetra.** [Observed peculiarities of coastal sea circulation and their relationship to the lateral irregularity of the wind.] *Akademiia Nauk SSSR, Doklady,* 54(3):227–230, **1946.** 2 figs., 2 refs., 2 eqs. **DLC**—Wind, current, water temperature and other oceanographic data were obtained from 3 anchored vessels and a moving ship making cross section from shore to 40 km from shore and along the shore for 130 km. Schematic diagrams show 3 dimensional current variations as affected by wind variations as one goes from shore to sea. The work was done in the summer of 1936 in one of the "interior seas of the U.S.S.R." Theory is applied to the circulation model to explain observed variations. *Subject Headings:* **1. Wind effects on ocean currents 2. Wind driven currents 3. Inland Seas of U.S.S.R.**—*M.R.*

9D–2 551.556:551.465

Shtokman, V. B., **Novye dokazatel'stva znacheniia neravnomernosti vetra kak odnoĭ iz prichin tsirkuliatsii v more.** [New evidence of significance of wind irregularities as one of the causes for oceanic circulation.] *Akademiia Nauk SSSR, Doklady, N. S.,* 58(1):58–56, Oct. **1947.** 3 figs., 4 refs., 3 eqs. **DLC**—The earlier unexplained, sometimes observed, phenomenon of interrupted (non-continuous) extension of equatorial counter currents on the surface of oceans—when the counter current appears in the form of separate, comparatively short sections, and does not expand as a continuous band of large zonal extent is explained in the light of the previously developed theory for the case when the tangential pressure of wind oriented, say, in zonal direction, changes, not only in direction lateral to the wind, but also in the direction of the wind. The resulting theory shows that, depending on the irregularity of the speed field of the trade winds—the equatorial counter-current can extend, at times in the form of a wide, at others, as a narrow current, and can occasionally disappear completely from the surface of the ocean, while continuing in the form of a sub-surface current. However, it should be noticed that the position of the rise-of-water boundaries remains unchanged. This explains the reason why the line of divergence which may exist inside of the counter current is not reflected on maps of mean isotherms of the surface of the Pacific Ocean. *Subject Headings:* **1. Wind driven currents 2. Oceanic circulation 3. Ocean currents 4. Pacific Ocean.**—*A.M.P.*

9D–3 551.556:551.465

Shtokman, V. B., **Vliianie rel'efa dna na napravlenie srednego perenosa, vozbuzhdaemogo vetrom ili polem mass v neodnorodnom okeane.** [Influence of relief of the sea floor on the direction of the mean water transfer occasioned by wind or mass fields in heterogeneous ocean.] *Akademiia Nauk SSSR, Doklady, N. S.,* 59(5):889–892, Feb. 11, **1948.** 3 figs., 3 refs., 11 eqs. **DLC**—Theoretical effect of a barrier on the channel bottom on the surface currents is shown schematically and worked out for three special cases. *Subject Headings:* **1. Wind driven currents 2. Bottom relief effects.**—*M.R.*

9D–4 551.465

Volker, Adrien, **Mouvements des eaux du lac Ijssel.** [Water currents of the Ijssel Lake.] *I.U.G.G. Association of Scientific Hydrology, Oslo 1948,* [*Transactions*], 1:386–391, [n.d.] 4 figs. **DWB**—Discusses currents in the lake, caused by wind, and shows isoline maps for selected situations. *Subject Headings:* **1. Lake currents 2. Ijssel Lake, Netherlands.**—*A.A.*

9D–5 551.465:629.12

van Duijnen Montijn, J. A., **Stroomberekening uit zonsbesteken.** [Drift calculation by means of solar reckoning.] *Netherlands. Meteorologisch Instituut, Opstellen op Oceanografisch en Maritiem Meteorologisch Gebied,* [No.] 7, **1949.** 19 p. 7 figs., 3 graphs, 2 refs. **DWB**—The calculations of drift for constant and variable ocean currents are discussed from data from one and two solar reckonings, respectively. Formulas for differing cases are given. *Subject Headings:* **1. Marine navigation 2. Ocean currents 3. Solar reckoning.**—*A.A.*

1950

9D–6 551.46:532

Lowell, Sherman C., **Gravity waves of finite amplitude.** *U. S. Office of Naval Research, London, Technical Report* No. ONRL-111-50, Nov. 9, **1950.** 3 leaves. eqs. **DWB**—The classical problem of steady gravity waves in an irrotational, incompressible fluid is treated by a new method by T. V. Davies of King's College University of London. It is a development of the method used by Levi-Civita. It has been used to solve problems (a) periodic waves in a channel of infinite depth, (b) the solitary wave, (c) periodic waves in a channel of finite depth and (d) periodic waves of the interface of two streams of finite depth. The methods of solution are presented. *Subject Headings:* **1. Gravity waves 2. Fluid mechanics.**—*I.L.D.*

9D–7 551.46:001

Mason, Martin A. (*Chief, Res. Sec., U. S. Beach Erosion Bd.*), **Vocabulaire technique international de l'ingénieur. Termes relatifs à la houle.** [The engineers technical and international vocabulary. Terms relating to waves.] *La Houille Blanche,* Grenoble, 5(2):161–163, March/April **1950.** In French and English. **DLC**—Disparaging comments on American usage (or misuse) of terms, followed by definitions in French and English of English terms used in oceanography such as: sea wave, ground swell, wave spectrum, surf beat, fetch, decay distance and travel time. *Subject Headings:* **1. Definitions 2. Wave terminology 3. Oceanography.**—*M.R.*

9D–8 551.465:525.3

Ursell, F. (*Math. Dept. Manchester Univ.*), **On the theoretical form of ocean swell on a rotating earth.** *Royal Astronomical Society, Monthly Notices, Geophysical Supplement,* 6(1):1–8, March **1950.** eqs., 9 refs. **DWB**—Swell has in the past been considered as a series of Stokes waves which would involve surface drift. Considering the rotation of the earth, it is demonstrated that each particle moves in a horizontal circle of inertia as well as in the nearby vertical Gerstner motion; with the diameter of the inertia circle greatest at the surface (several hundred meters in some cases) and the period of revolution half a pendulum day (12 consecutive ϕ hours, where ϕ is latitude). Except for this circular movement there is no mass transport and thus no ground for assuming that ocean drift currents are due to fluid transport with the waves. Waves however appear to provide a reasonable mechanism for generation of inertia currents. *Subject Headings:* **1. Ocean swell generation 2. Drift currents 3. Rotation of the earth.**—*M.R.*

1951

9D–9 551.46:656

Deacon, G. E. R., **Application of oceanographical research to navigation (summary of lecture).** *Marine Observer,* 21(153):188–191, July **1951. DWB**—Summary of a lecture, at the Institute of Navigation, dealing with measurement of ocean currents, wave recorders and their use in predicting swell. *Subject Heading:* **1. Oceanography.**—*C.E.P.B.*

9D–10 551.465

Fuglister, F. C., **Multiple currents in the Gulf Stream system.** *Tellus,* 3(4):230–233. Nov. **1951.** 2 figs., 8 refs. **DLC**—The temperature distribution at a depth of 200 m in the Gulf Stream region indicates that the Gulf Stream system is made up of a series of overlapping currents. These currents are separated by relatively weak countercurrents. The available temperature and salinity sections give the same results. Multiple currents are required also by a theory of Rossby. *Subject Headings:* **1. Currents 2. Gulf Stream 3. Atlantic Ocean.**—*A.A.*

9D–11 551.465

Gulf Stream mapped. *South African Journal of Science,* 48(4):123, Nov. **1951. DLC**—A brief note on operation "Cabot," the multiple ship survey sponsored by U. S. Navy and Woods Hole of the Gulf Stream in the summer of 1950. *Subject Headings:* **1. Ocean currents 2. Gulf Stream.** —*M. P. Kramer.*

9D–12 551.465

Longinov, V. V., **O skorosti priamogo i obratnogo dvizheniia vody otnositel'no dna v trokhoidal'noĭ volne.** [The velocity of reciprocal water motion near the bottom by trochoidal wave.] *Akademiia Nauk SSSR. Institut Okeanogologii, Trudy*, 5:70–72, **1951.** fig., 4 refs. **DLC**—The author proposed that the most important factor in formation of accretions is the reciprocal water motion near the bottom and asymmetry of the speed. This phenomenon was indicated by CORNAGLIA in 1881, ARRIGO in 1936, THIERY in 1930–1931 and ZENKOVICH in 1946. Here it is proved that such asymmetry originates in consequence of trochoidal form of wave motion. *Subject Headings:* **1. Wave action.**—*N. T. Zikeev.*

9D–13 551.460.018

Longinov, V. V. and Kestner, A. P., **Pervyĭ opyt primeneniia priborov VDK-2 i elektrovolnografa dlia izucheniia volneniia na melkovod'e.** [First experiment of application of VDK-2 instruments and electric wavegraph for swell in shallow water.] *Akademiia Nauk SSSR, Institut Okeanologii*, Moscow, 5:93–107, **1951.** 7 figs., 7 tables, 4 refs. **DLC**—A detailed description of the structure, methods of installation and application of electric instruments recording the wave height (wavegraph) and pressure in the near-bottom layer, designed by VERSHINSKIĬ, DEPREIS and KESTNER (V.D.K.), as well as of results of the first tests of these instruments carried out in Nov. 1949 in the Black Sea, are presented and discussed. The analysis and working out of oscillograms and other obtained material shows that the wavegraph insures: full reliability of observations at any time of the day and in any weather; the possibility of getting all needed wave parameters as well as an uninterrupted or selective registration of the sea level. The pressure measurer based on the electrotensometer principle serves for the registration of any current (from centimeter fragments of several meters per second) in any horizon of the sea or other reservoirs; it can also serve for registration and uncovering of the smallest vertical pressures, for instance the passage of "surge forerunners," etc. Some suggestions concerning future improvements of the instruments are added. *Subject Headings:* **1. Oceanographic instruments 2. Swell 3. VDK-2 instruments.**—*A.M.P.*

9D–14 532.59:551.468

Miyazaki, Masamori (*Kobe Marine Obs.*), **Mathematical studies on surf and breakers—non-linear wave theory in shallow water of constant slope.** *Oceanographical Magazine*, Tokyo, 3(2):65–74, June **1951.** 5 figs., 8 refs., eqs. **DWB, DLC**—In this paper the wave deformation in shallow water is investigated for an elementary nonlinear case, and the problem treated under the following circumstances: 1. Two-dimensional wave motion propagates on to the sloping beach. 2. The bottom slope is constant and gentle. 3. The motion is non-rotational until waves become unstable and then break. *Subject Headings:* **1. Shallow water wave theory 2. Wave propagation 3. Surf 4. Breakers.**—*Author's abstract.*

9D–15 551.461.2:525.6(45)

Polli, Silvio, **Tabelle di previsione delle maree per il Golfo di Trieste per l'anno 1952.** [Tables for predicting tides in the Gulf of Trieste for 1952.] *Trieste. Istituto Talassografico*, Publ. No. 274, **1951.** 15 p. tables. **DLC**—Time and deviation from mean sea level of each ebb and flow predicted for Trieste in 1952, is tabulated. Corrections on account of monthly variation in mean sea level, of monthly mean pressure and of wind are given. Time lags (in relation to Trieste) for 12 ports are indicated. Tides are half-daily during new and full moon and daily during first and last quarter, with maximum amplitudes of 86 and 22 cm, respectively. *Subject Headings:* **1. Sea level variations 2. Tides 3. Gulf of Trieste 4. Italy.**—*G.T.*

9D–16 551.513:551.465

Zubov, N. N., **Nekotorye soobrazheniia o poverkhnostinykh techeniiakh okeanov i morei.** [Some remarks on the surface currents in oceans and seas.] *Voprosy Geografii*, No. 26:211–219, **1951.** fig., refs. **DLC**—A systematic general review on the connection between the general circulation of the atmosphere and the surface currents of the oceans. Author states that ocean currents parallel the atmospheric isobars, but does not explain the mechanism of the interaction, claims the inhomogeneous distribution of evaporation and precipitation as the main cause for the cross flow of water from low to high levels of the ocean without mentioning the drift current in this direction. Furthermore, he tries to explain the equatorial counter current by a surface gradient between two continents (South America and Africa for example), disregarding the explanation by the asymmetric wind field, given previously by G. NEUMANN (*Forschungen und Fortschritte* 21–23:177–179, **1947**). The author claims that ocean currents around islands and near the shores of the continents, as well as the circulation in closed seas, are caused mainly by the water flow from rivers, modified by the Coriolis force. *Subject Headings:* **1. Ocean currents 2. Ocean-atmosphere interaction 3. Atmospheric circulation.**—*A.A.*

1952

9D–17 551.465:525.6

Bowden, K. F. and Fairbairn, L. A., **A determination of the frictional forces in a tidal current.** *Royal Society of London, Proceedings, Ser. A,* 214(1118):371–392, 23 Sept. **1952.** 4 figs., 8 tables, 11 refs., eqs. **DWB**—From observations with open-sea tide gages off Anglesey the amplitude and phases of the frictional forces at the bottom (7–10 fathom), the internal shearing stress at various depths, and the mean eddy viscosity are found. *Subject Headings:* **1. Tides 2. Viscosity of sea water.**—*C.E.P.B.*

9D–18 532.593:551.465

Crease, J. (*Nat. Inst. of Oceanog.*), **The origin of ocean currents.** *Institute of Navigation, London, Journal,* 5(3):280–284, July **1952.** 5 refs. **DLC**—Theories explaining the physical forces which create ocean currents are reviewed and discussed. Particular attention is given to the combined effect of wind stress, lateral friction and the earth's rotation. The effect of radiation and heat exchange is considered. *Subject Headings:* **1. Ocean currents 2. Wind driven currents.**—*G.T.*

9D–19 551.46(27)

†Ford, William L. and Miller, A. R., **The surface layer of the Gulf Stream and adjacent waters.** *Journal of Marine Research,* 11(3):267–280, **1952.** 7 figs., bibliog. p. 269–280. **DWB**—This paper presents a description of the Gulf Stream system between Cape Hatteras and 63° long. and gives a qualitative analysis of the water masses in the surface layer on the basis of observations taken from Nov. 15 to Dec. 6, 1948. The edge of the Stream was explored for 1050 mi of its length. The meanderings of the Stream and its tendency to develop large eddies are demonstrated. Of special note was the 90° change in direction of the mean axis of a 150-mi segment of the Stream within a period of two weeks. Surface current velocities are given for many points; flows in excess of 5.5 knots were found on several occasions. By means of a T-S analysis applicable during the period of the cruise, the surface layer of the system is described in terms of four water types. The occurrence and interplay of these water types are discussed. Noteworthy features are (a) the presence of Shelf water at certain points along the edge of the Stream and (b) the modification of the surface layer of the Stream by the addition of Sargasso water, with no evidence of the absorption of Slope waters. *Subject Headings:* **1. Oceanographical surveys 2. Gulf Stream.**—*Authors' abstract.*

9D–20 551.465

Hansen, Walter, **Einige Bemerkungen zum Golfstromproblem.** [Some remarks on the problem of the Gulf Stream.] *Deutsche Hydrographische Zeitschrift,* 5(2/3):80–94, **1952.** 8 figs., 10 refs., 3 eqs. German, English, French summaries p. 80–81. **DWB**—Methods of study of ocean currents and the 3-dimensional microstructure of the Gulf Stream are discussed. *Subject Headings:* **1. Ocean currents 2. Gulf Stream.**—*C.E.P.B.*

9D–21 551.465:538.3:532.51

Malkus, W. V. R. and Stern, M. E. (*both, Woods Hole Oceanog. Inst., Woods Hole, Mass.*), **Determination of ocean transports and velocities by electromagnetic effects.** *Journal of Marine Research,* 11(2):97–105, Nov. **1952. DWB, DLC**—The electric potentials in and about an ocean current are shown to be related in a simple fashion to the total fluid transport. In many waters, surface measurements alone permit the determination of this total transport. It is also established that the local vertical potential gradient is a measure of the local velocity. Several techniques of measurement, including the "Geomagnetic electrokinetograph" method, and the errors which may be involved in each, are discussed. *Subject Headings:* **1. Ocean currents 2. Ocean current measurement 3. Electromagnetic effects.**—*Authors' abstract.*

9D–22 551.461.2

Maruszczak, Henryk, **Istota i przyczyny zmian poziomu morza.** [Nature and causes of changes in the sea-level.] *Czasopismo Geograficzne,* Warsaw, 21/22(68):69–101, **1952.** 24 refs. **DLC**—After pointing out that the nature of changes in sea level have been known for a long time (ARISTOTLE, LEONARDO DA VINCI), the author analyzes the factors producing the phenomenon which arise in the hydro- and litho-spheres. Characteristic features of the changes of sea level are discussed and the question of existence of large-scale periodic fluctuations of sea level is examined. G. V. LONDBERG's hypothesis **On the causes of preservation of the land's microrelief on the floor of the ocean** is critically reviewed and refuted. The following conclusions were reached: 1. The ocean floor is composed of a series of concave and convex expanses caused by the gravitational force, winds, sea currents and pressure and temperature variations; 2. Changes in sea level can be determined only in regard to the surface of the lithosphere; 3. Causes of changes of the coastal line lie as well in the hydro- and litho-spheres as beyond them; 4. The shore line is in constant movement. One can

identify the phenomenon of a certain kind of rhythm taking place at certain periods from tidal waves to waves occurring in ten and 100 million year periods. The duration of these periods depends on the kind of movement studied. Periods of local movements in contrast to planetary are comparatively short. The amplitude of oscillation of the coast line is much larger (of several km order) in case of local changes than in case of general vacillations. *Subject Headings:* **1. Sea level variations 2. Ocean floors 3. Reviews. I. Londberg, G. V.**—*A.M.P.*

9D-23 532.59:551.46.018

†Snodgrass, F. E., **Wave measurements.** *National Research Council, Wash., D. C., Publication*, No. 309:139–165, **1952.** table, refs., p. 162–163, eqs. Discussion by Walter Munk and Carl Ickart, p. 159–161. **DLC**—Instruments to measure height and period of waves and swell near the shore, have been developed, but little progress has been made in measuring other wave characteristics. This paper reviews the many methods that have been utilized for measuring gravity waves of a period 1 to 30 sec and suggests solution for other measuring problems. Among these are wave direction measurement (not satisfactory yet), subsurface current recorder, tripartite wave recorders, deep water wave recorders (spar buoys), long period wave recorders (12–16 sec) or forerunners (up to 30 sec), Tsunami recorder, shore recorders, subsurface pressure gages, electric cable installation; analysis of wave records for height, period and analysis of sub-surface pressure records; classification of waves and, finally, tides are discussed. *Subject Headings:* **1. Ocean wave measurement 2. Ocean wave recorders. I. Munk, Walter II. Ickart, Carl.**—*M.R.*

9D-24 551.465(27)

von Arx, William S. (*Woods Hole Oceanog. Inst., Woods Hole, Mass.*), **Notes on the surface velocity profile and horizontal shear across the width of the Gulf Stream.** *Tellus*, 4(3):211–214, Aug. **1952.** 3 figs., 5 refs. **DLC**—Measurements of surface velocities of currents were made by means of the Loran space dead reckoning method and the electromagnetic method during a cruise across the Gulf Stream in Oct. 1950. Preliminary reconnaissance revealed "an anticyclonic bend that was crossed repeatedly at nearly right angle to the flow." A sharply peaked distribution of velocity across the current was evident. "The average activity of horizontal shear normal to the flow on the right was equal to or less than Coriolis parameter while the average values of the cyclonic shear on the right were equal to or greater than this." *Subject Headings:* **1. Surface velocity of currents 2. Ocean currents 3. Gulf Stream.**—*I.L.D.*

9D-25 551.46

Yu, Yi-yuan, **Breaking of waves by an opposing current.** *American Geophysical Union, Transactions*, 33(1):39–41, Feb. **1952.** 2 figs., refs., 12 eqs. **DWB**—A brief review of the theory with experimental verification. Complete breaking occurs when the velocity of the opposing current reaches $\frac{1}{4}$ of the velocity of the waves going upstream against a moving current. *Subject Heading:* **1. Ocean waves.**—*A.A.*

1953

9D-26 551.46

Boden, Brian P. and Kampa, Elizabeth M., **Winter cascading from an oceanic island and its biological implications.** *Nature*, London, 171(4349):426–427, March 7, **1953.** 2 figs., 2 refs. **DWB**—Circulation on and around Bermuda platform (depth 15 m) is shown to a depth of 100 m. This is associated with cooler more saline surface water in the lagoon than outside; density isolines plotted. Circulation is described as a cyclonic convergent movement about a sinking center. *Subject Headings:* **1. Oceanic circulation 2. Bermuda.**—*C.E.P.B.*

9D-27 532.59

Bossolasco, Mario, **Caratteristiche e genesi del moto ondoso del mare nel Golfo di Genova.** [Characteristics and source of the wave motion of the sea in the Gulf of Genoa.] *Accademia Nazionale dei Lincei, Rome. Classe di Scienze Fisiche, Matematiche e Naturali, [Atti]*, Ser. 8, 14(1):59–64, June **1953.** 2 figs., 3 tables, 4 refs. **DLC**—Statistical results of wave frequency, amplitude and apparent steepness are given. The amplitude shows a correlation with the barometric tendency. Some synoptic cases are discussed in terms of isallobaric systems. *Subject Headings:* **1. Wave motion 2. Isallobars 3. Gulf of Genoa, Italy.**—*A.A.*

9D-28 551.465:550.342

Debrach, Jean, **Enregistrement simultané des microséismes et des houles à Casablanca.** [Simultaneous recording of microseisms and sea swells at Casablanca.] *Rabat, Morocco. Institut Scientifique Chérifien. Service de Physique du Globe et de Météorologie, Casablanca, Recueil des Publications*, No. 2, **1953.** fig., table, 7 refs. **DWB.** Reprint from *Société des Sciences Naturelles du Maroc, Comptes Rendus*, No. 2:35–37, **1953.**—A more sensitive swell recorder and a vertical Coulomb-Grenet

mean period seismograph were installed and both microseisms and swell were registered simultaneously upon the same record. The difficulty of defining a unique period for the swell and for the microseisms, especially for the latter, is stressed. Data on prevailing swell and microseism periods are given. *Subject Headings:* **1. Microseisms from ocean swell 2. Ocean swell recorders.**—*I.L.D.*

9D–29 551.465(265)

Hirano, Toshiyuki (*Tokai Regional Fisheries Res. Lab.*), **Horizontal mixing and flow in a boundary area of the Kuroshio off Nojima-Zaki.** *Oceanographical Society of Japan, Tokyo, Journal*, 8(3/4):105–112, March **1953.** 6 figs., table, 4 refs., 11 eqs. **DWB**—Observations were made on 4 cruises in March through July 1950 in the area south of Tokyo between 35°N and Hachijo Island. Vertical distribution of sea temperatures showed that the boundary between the warm Kuroshio and the cold Oyashio flowing down the Pacific coast of Japan is always sharp and relatively stationary. This steadiness is investigated by studying the horizontal diffusivity between the two currents. *Subject Headings:* **1. Dynamics of ocean currents 2. Kuroshio Current.**—*C.E.P.B.*

9D–30 551.465(266)

James, P. A. A., **Aguaje, the Callao painter.** *Weather*, 8(7):208–209, July **1953.** 2 refs. **DWB**—Account of the effects of a sudden rise of sea temperature off Peru which occurs about Christmas. It kills off marine life, decomposition of which releases hydrogen sulfide which turns paintwork of ships black (hence the name). *Subject Headings:* **1. Ocean currents 2. Aguaje 3. Peru.**—*C.E.P.B.*

9D–31 551.465:551.556

Kitkin, P. A., **O rel'efe svobodnoĭ poverkhnosti i poverkhnosteĭ razdela v more peremennoĭ plotnosti.** [The relief of a free surface and of surfaces of discontinuity in a sea with variable density.] *Akademiia Nauk SSSR, Izvestiia, Ser. Geofizicheskaia*, No. 6:526–545, **1953.** 6 figs., 2 refs., numerous eqs. **DLC**—A theoretical solution is given of the change of positions of a free sea surface of nonuniform density in which two discontinuity surfaces of density exist. The exchange of amount of motion in horizontal and vertical directions due to turbulence and the influence of Coriolis force are taken into account in this study. Particular attention is given to the influence of irregular wind and vertical variation which arises after stoppage of wind. *Subject Headings:* **1. Discontinuity surfaces 2. Sea surface contours 3. Wind effects on water surfaces.**—*Translation of author's abstract.*

9D–32 551.552:551.556:551.46

Kobe, Japan. Marine Observatory, **The results of the surface observations on board of the R.M.S. "Syunpu-Maru" in Harima-Nada and the local meteorological observations in Shodo-Shima.** *Journal of Meteorological Research*, Tokyo, 5(5):329–343, June **1953.** 15 figs. In Japanese; English summary p. 329. **DWB**—Surface observations in Harima-Nada on board the R.M.S. "Syunpu-Maru" and local weather observations in Shodo-Shima were made during the four-day period July 25–29, 1952. The stream lines, relations between sea wave and wind velocity, and oceanographic conditions in Harima-Nada were mainly investigated. Results are presented in this paper. *Subject Headings:* **1. Streamlines 2. Wind waves 3. Oceanographic observations 4. Harima Sea.**—*Authors' abstract.*

9D–33 551.465

Lisitzin, Eugenie, **On internal waves in the Northern Baltic.** *Finland. Merentutkimuslaitos, Julkaisu*, No. 161, **1953.** 9 p. 3 tables, 12 refs.—Study is based on harmonic analysis of temperature and salinity data from surface to 30 m depth on the lightship "Storbrotten" 60°26′N, 19°13′E for every 4 hours from 19 to 29 July, 1922 and salinity data for lightship "Årangsgrund" 6 times daily for July 11, 1914, 59°57′N, 24°57′E to 50 m depth and water level records on the coast at Hellman (60°12′N, 19°18′E). Internal waves are not caused directly by tides but by periodic variations in tidal currents. Salinity differences for semi-decimal component are 8 to 10 times those of temperature differences. More horizontal than vertical displacement of water masses is evident. *Subject Headings:* **1. Internal sea waves 2. Salinity data 3. Baltic Sea.**—*M.R.*

9D–34 551.46:532.59

Longuet-Higgins, M. S., **Mass transport in water waves.** *Royal Society of London, Philosophical Transactions*, A, 245(903):535–581, March 31, **1953.** 8 figs., table, 20 refs., 327 eqs. **DLC**—A general theory of mass transport is developed which takes account of viscosity and gives results agreeing with observation. The nature of the motion in the interior of the fluid, and the oscillating boundary layer, are discussed. The results are applied to progressive waves and a standing wave in water of uniform depth. *Subject Headings:* **1. Wave motion 2. Water mass transport.**—*C.E.P.B.*

9D–35 551.465

Mamaev, O. I., **K voprosu o meandrirovanii okeanskikh techeniĭ.** [Meandering of ocean currents.] *Moscow. Universitet, Vestnik*, 3:83–93, **1953.** 8 figs., 9 refs., 7 eqs. **DLC**—The literature on the meandering of ocean currents is reviewed and the existing opinions on the cause of meandering are reviewed critically. Meandering is attributed to (1) influences acting across the current and immediately displacing it sidewards and (2) influences acting on the direction of the current and manifesting themselves chiefly as changes in current velocity. The meandering of currents is analyzed, theoretically on the model of river meandering, and the following fundamental formulas are derived:

$$L = \frac{2BV_m}{\sqrt{V_{np}^2 - V_m^2}},$$

$V_{np} = v_{cp} + \frac{1}{2}\Delta v_{\max}$, and $V_m = (v_{cp} + \frac{1}{2}\Delta v_{\max}) \cos \alpha$ where $(v_{cp} + \frac{1}{2}\Delta v_{\max})$—velocity at point of greatest deviation from initial direction. α—angle of deviation, L—length of cross wave, V_m—velocity of cross wave or meander, v_{cp}—velocity of longitudinal wave, B—extent of ocean area and $v = \frac{\sqrt{L^2+4B^2}}{T}$ (T—period of cross wave). *Subject Headings:* **1. Ocean currents 2. Current meandering.**—*I.L.D.*

9D–36 551.465:551.460.183

Nan'niti, T. (*Met. Res. Inst., Tokyo*), **A current meter using a phototube, Pt. 2, Experiment on a wind drift current in a rising state.** *Papers in Meteorology and Geophysics*, Tokyo, 4(2):66–73, Sept. **1953.** 6 figs., 4 tables, 4 refs. **Pt. 3, Experiments on a tidal current,** *Ibid.*, 5(1):54–63, April **1954.** 13 figs., 6 refs., 11 eqs. (Note: **Pt. 1,** *Ibid.*, 3: p. 286, **1953.**) **DWB, MH-BH**—The author observed a drift current in a rising state, using his newly designed current meter. On the record obtained, distinction can be made between the rising drift current, a proper ocean current and an apparent ocean current caused by a swing of the current meter due to the yawing, pitching and rolling of the research ship "Asasiwo Maru" in bad sea conditions. In Pt. 3, the author observed a tidal current, using his current meter 1 and two others of different kinds simultaneously. He explained that the observed velocity fluctuation with the period of 1.5 hrs was caused by the instantaneous penetration of the waters broken from the disturbance, and the time variation of velocity was due to the effect of vertical eddy viscosity and the change of the surface slope with time. Further, he analyzed the shorter period disturbance and found that its eddy diffusion coefficient K∼269 c.g.s., its mean length of eddy 1∼124 cm. *Subject Headings:* **1. Current meters 2. Tidal currents 3. Drift calculations.**—*Author's abstracts.*

9D–37 551.461.2

Polli, Silvio, **Il graduale aumento del livello del mare lungo le coste Italiane.** [Gradual rise in the sea level along the Italian coast.] *Geofisica Pura e Applicata*, 25:123–129, **1953.** 3 tables, refs. Italian and English summary p. 123. **MH-BH**—The secular variations of the mean sea levels and their standard deviations were calculated for eleven Italian stations. The mean value of the variation for the Italian seas amounts to a sea level rise of 16 cm/100 years; while that of all the seas of the earth amounts to 11 cm/100 years. The higher value for the Italian seas is explained by the sinking of the Naples and Venice coasts. *Subject Headings:* **1. Sea level variations 2. Italy.** —*I.L.D.*

9D–38 551.465

Roll, H. U., **Wellen und Wellenwirkungen an der Küste.** [Waves and wave effects on the coast.] *Umschau*, 53(15):431–434, July 15, **1953.** 6 figs., 10 refs. **DWB**—An account of the changes of tsunami and wind waves as they approach the coast and break or foam. Reflection and refraction of waves at obstacles, transport of water and causes of damage are discussed. *Subject Heading:* **1. Wave action.**—*C.E.P.B.*

9D–39 551.465:532.593

Roux, Georges, **L'enregistrement et l'analyse de la houle à Casablanca.** [Recording and analysis of the sea swell at Casablanca.] *Rabat, Morocco. Institut Scientifique Chérifien. Service de Physique du Globe et de Météorologie, Recueil des Publications*, No. 3, **1953.** 8 p. 5 figs., refs. **DWB.** Reprint from *Institut Océanographique, Monaco, Bulletin*, No. 1023, March 10, **1953.**—A brief history of the French investigations on the phenomenon of sea swell along the African coasts and the Mediterranean since 1912 is presented. A description of the manometric sea swell recorder installed at Ain-Dinh and of the analyzer (illustrated) with diagrams and a sample of sea swell analysis are given. *Subject Headings:* **1. Ocean swell 2. Ocean wave recorders 3. Mediterranean Coast.**—*I.L.D.*

9D–40 551.465(263)(09)

Schumacher, Arnold, **Die westatlantische äquatoriale Gegenströmung seit hundert Jahren bekannt.** [The western Atlantic equatorial counter current known 100 years ago.] *Deutsche Hydrographische Zeitschrift*, 6(4/6):224–226, **1953.** fig., 8 refs. **DWB**—Refers to: CH. PH. DE KERHALLET, **Considérations générales sur l'océan Atlantique,** *France. Service Hydrographique de la Marine, Annales Hydrographiques*, Paris, 7:33–70, **1852,** in which a counter current in low northern latitudes of Western Atlantic is clearly shown on a chart and described. *Subject Headings:* **1. Equatorial counter current 2. History of oceanography 3. Western Atlantic.**—*C.E.P.B.*

9D–41 551.465

Shtokman, V. B., **Nekotorye voprosy dinamiki morskikh techeniĭ.** [Some problems of the dynamics of sea currents.] *Akademiia Nauk SSSR, Izvestiia, Ser. Geofiz.*, No. 1:69–77, **1953.** table, 6 refs., 19 eqs. **DLC**—The influence of the changes with latitude of the Coriolis force upon the distribution of total currents and densities in the mean cross section of an elongated sea is very small for all intracontinental seas of the earth. This condition simplified considerably the calculation of total flow and densities of the mean cross section of bodies of water extended in the direction of the wind in the presence of a given wind irregularity. A qualitative evaluation of the thickness of the baroclinic layer leads to the conclusions that the thickness of the baroclinic layer is least at the equator as a result of the effect produced by the change of the Coriolis force with latitude (all other conditions being the same). *Subject Heading:* **1. Dynamics of ocean currents.**—*I.L.D.*

9D–42 551.465

Shtokman, V. B., **Ob uchete "bokovogo" treniia v dinamike morskikh techeniĭ (kritika rezul'tatov Khidaka).** [The calculation of side friction in the dynamics of ocean currents (criticism of K. HIDAKA's results).] *Akademiia Nauk SSSR, Doklady*, 88(5):795–798, **1953.** fig., 9 refs., 4 eqs. **DLC**—Development of the theory of wind circulation on the oceans by using the method of "complete currents" often takes the wrong direction. As an example, the works of Japanese oceanographer K. HIDAKA are analyzed and the errors explained. In HIDAKA's formulas the members of the lateral friction do not include the change of speed along the given direction, which is not permitted in case of a concentric system τ. The lines of complete currents must have a considerable curvature not only near the angles of a rectangular field, but also in the central part, as much as the curvature of the isolines τ varying continuously increases with the approach to the central part. This makes it clear that the change in speed of the current will be significant not only in the transverse but also in the longitudional direction. Thus the calculations made by HIDAKA are not correct from physical and mathematical viewpoint. The members $\partial^2 u/\partial x^2$, $\partial^2 v/\partial y^2$ in the equation (1) could be neglected only in case of a linear system of wind blowing along the axis of a rectangular sea, and only for the central cross section perpendicular to the wind current. *Subject Headings:* **1. Ocean currents. I. Hidaka, K.**—*N.T.Zikeev.*

9D–43 551.465

*Stommel, Henry (*Woods Hole Oceanog. Inst.*), **Examples of the possible role of inertia and stratification in the dynamics of the Gulf Stream system.** *Journal of Marine Research*, 12(2):184–195, Dec. 1, **1953.** 4 figs., 2 tables, refs., 3 eqs. **DLC**—An hypothesis is offered to explain certain major features of the Florida Current: (1) the large axial gradient of vorticity, (2) the fact that seasonal fluctuations in the Miami-Cat Key tide gauge difference are twice the amplitude of those in the Key West-Havana tide gauge difference, and (3) the fact that the Havana-Cat Key difference is at a maximum during the period of minimum flow—the opposite of what might ordinarily be expected. An elementary perturbation theory of meanders in a wide stratified current is presented and its possible application to Gulf Stream meanders is discussed. *Subject Headings:* **1. Florida currents 2. Gulf stream dynamics 3. Current meandering.**—*Author's abstract.*

9D–44 551.465

Tessa, A. C., **Trains de houle à l'île de Ribamaru.** [Wave trains at Ribamaru Island.] *La Houille Blanche*, 8(3):420–422, June/July **1953.** 2 figs. **DLC**—Simultanous wave measurements were made from a lighthouse and a plane. The observer in the plane regularly counted half less waves per train. Possible explanations of the phenomenon are proposed. *Subject Headings:* **1. Wave trains 2. Airplane wave observation 3. Ribamaru Island.**—*A.A.*

1954

9D–45 551.501:551.465

Bernard, Pierre (*Inst. de Phys. du Globe de Paris*), **Opportunité d'enregistrements de longue durée des ondes internes.** [Opportunity for long period recording of internal waves.] *I.U.G.G. Association of Physical Oceanography, Rome, Sept. 14–25, 1954, Procès-Verbaux.* Bergen, **1954.**

p. 232–233. **DWB**—In order to determine whether meteorological influences are the initial cause of internal movements of the sea as stated by TAKEGAMI, H. PETTERSSON, SANDSTROM and SEIWELL, the author suggests the organization of a continuous series (of at least one year to establish seasonal variations) of measurements made according to IDRAC's method. These measurements, made with recording thermographs immersed at various depths sufficiently close to each other, would enable one to determine, without any supplementary soundings, the vertical temperature gradient essential to reduce thermic oscillations into displacement amplitudes. *Subject Headings:* **1. Ocean wave measurement 2. Thermographs.**—*A.M.P.*

9D–46 551.465

†Bowden, K. F. (*Natl Inst. of Oceanog., Wormley, Eng.*), **Direct measurement of subsurface currents in the oceans.** *Deep-Sea Research*, London, 2(1):33–47, Oct. **1954.** fig., 31 refs. **DWB**—Direct measurements have provided a comparatively small proportion of our knowledge of subsurface currents in the oceans. Such measurements are necessary, however, in order to confirm and supplement the estimates of currents obtained by other methods, and in this article a survey is given of the measurements which have already been made, mostly by current meter from an anchored ship. The apparatus and techniques employed in making the observations and the methods of analyzing the data, in order to separate the mean current from the tidal and other periodic currents, are described briefly. The results of the measurements are discussed, particularly for the mean currents and semidiurnal tidal currents in the Atlantic Ocean, where the greater part of the observations have been made. *Subject Headings:* **1. Subsurface current measurement 2. Atlantic Ocean.** —*Author's abstract.*

9D–47 551.461:016

†British National Report of physical oceanography 1951–1954. *I.U.G.G. Association of Physical Oceanography, Rome, Sept. 14–25, 1954, Procès-Verbaux.* Bergen, **1954.** 111–120. bibliog. 118–120. **DWB**—A catalog of surveys, reports and papers covering the fields of: oceanic surveys, water circulation in the oceans, wind and currents, storm surges, tides and internal waves, waves, waves and microseisms, light penetration, the ocean floor and chemistry of sea water, with the years of their completion, is presented. A list of references is included. *Subject Headings:* **1. Oceanographic surveys 2. Great Britain.**—*A.M.P.*

9D–48 551.556:551.463:778.3

California. Univ. Scripps Institution of Oceanography, **Investigations of the physics and chemistry of the air-sea boundary layer.** Contract AF19(122)-413, Progress Reports 1–3, Dec. 12, 1950–Sept. 15, **1951.** 3 pieces. Mimeo. fig., refs. Also its: **Final Report, April 15, 1954.** 17 p. **DWB**—Report No. 1 tells of establishment of a project to measure the roughness of the sea surface from photographs of the sun's glitter on water. Grids were constructed which, placed over a photograph, tell at once the slope of the water surface where a highlight appears. A review of the literature on very short waves was conducted. The second report is descriptive of the use of an Air Force B-17 (equipped with four K-17 cameras) for photographing the sun's glitter and a schooner for gathering meteorological and oceanographical data. Review of literature on the accelerated attenuation of ripples by surface films leads to conclusion that there may be several mechanisms by which surface waves are altered in amplitude and shape and that the process has not yet been described in quantitative terms. Report No. 3 is descriptive of the sea-surface glitter and slick observational program carried out around Maui, T. H., which completed this phase of the contract work Oct. 4, 1951. Measurements of wind stress in the Mission Bay Yacht Pond were made periodically and are being analyzed. The final report summarizes progress on this contract toward analyzing certain statistical properties of the geometry of the air-sea boundary and measuring the momentum flux across this boundary. The results have some bearing on turbulence conditions in the vicinity. Plans for future research include a more complete spectral description, measurement of the probability distribution of curvature, wind stress studies and study of oscillations centered at the inversion layer. (For Reports 1 and 2, *see* 5K–113, Nov. 1954, *MAB.*) *Subject Headings:* **1. Energy exchange sea-atmosphere 2. Aerial photography 3. Ocean wave measurement 4. Wind stress. I. Contract AF19(122)-413 II. Munk, Walter H. III. Ewing, Gifford C.**—*From author's abstract.*

9D–49 551.515:551.461.2(64)

†Debrach, J. (*Service de Physique du Globe et de Météorologie*), **Envahissements du littoral et raz de marée au Maroc.** [Coastal inundations and tides at Morocco.] *France. Comité d'Océanographie et d'Études des Côtes du Maroc, Bulletin Scientifique, Ser.* 2, No. 2:3–14, **1954.** fig., 3 tables, 22 refs. **DWB**—These inundations are of seismic as well as meteorological origin. The seismic waves of the past in different parts of the earth are first discussed and then those surges of meteorological origin, such as the North Sea surge of Feb. 1953, discussed and a table presented to show the frequency

of swell of 6 degrees of height as observed from 1928–42 at Rabat, Casablanca, Agadir, Mehdin, Safi and Mogador, presented and examples of mareographs during high tides shown. *Subject Headings:* **1. Storm surges in Morocco 2, Morocco.**—*M.R.*

9D–50 551.465:629.12

Frankcom, C. E. N. and Barlow, E. W., **Surface currents of the ocean and their effects on navigation.** *Institute of Navigation, London, Journal,* 7(4):343–361, Oct. **1954.** 5 figs. Discussion p. 355–361. **DWB**—FRANKCOM reviews history of observation of ocean currents and discusses methods of determining current. BARLOW discusses variability of currents and types of current chart. A general current and wind chart is given for Atlantic with more detailed examples for part of Gulf Stream and for N.E. and S. W. monsoons and transitional months in China Sea. In the discussion much reference was made to the variability of the Gulf Stream and to the effect of winds on currents. *Subject Headings:* **1. Ocean currents 2. Marine navigation.**—*C.E.P.B.*

9D–51 551.46

Granqvist, Gunnar (*Inst. of Marine Res., Helsinki*), **Oceanography in Finland.** *I.U.G.G. Association of Physical Oceanography, Rome, Sept. 14–25, 1954, Procès-Verbaux.* Bergen, **1954.** p. 134–135. **DWB**—The Institute of Marine Research continued its regular observations on ice, salinity, temperature, currents and water level in the coastal regions. A special research ship is scheduled to start operating in the summer of 1954. *Subject Headings:* **1. Oceanographic research 2. Finland.**—*A.M.P.*

9D–52 551.465

Hakodate, Japan. Marine Observatory, **Report on the oceanographical observation of the sea off Tohoku District made on board the R.M.S. Yushio-maru in summer 1953 (1st paper).** *Japan. Central Meteorological Observatory, Tokyo, Oceanographical Report,* 3(3):1–6, July **1954.** 4 figs., 2 tables. In Japanese; English summary p. 1. **DWB**—The oceanographic conditions of the waters off Tohoku District were investigated on the basis of observations made on board the R.M.S. "Yushio-maru" during Aug. 23 to Sept. 5, 1953. A southward strong current was observed at the boundary between "Oyashio" and Tsugaru warm current, which velocity was estimated to be 0.9 kn by dynamical calculation. A branch of Kuroshio extension was observed as a clockwise circular current, with the center at 39°.5N, 144°.8E and the velocity 0.7–1.0 kn. The transports of these two currents were estimated to be of the order of 7×10^6 m³/sec, and 6×10^6 m³/sec, respectively. Some considerations were also made with regard to water temperature, chlorinity and dissolved oxygen. *Subject Headings:* **1. Oceanographic observations 2. Ocean currents 3. Japan Coast.**—*Author's abstract.*

9D–53 551.465

*Hakodate, Japan. Marine Observatory, **Report of the oceanographical observations in the sea off Tohoku District made on board the R.M.S. Yushio-Maru in spring and summer 1952. (First Paper.)** *Japan. Central Meteorological Observatory, Tokyo, Oceanographical Report,* 3(4):205–215, Dec. **1954.** 34 figs. In Japanese; English summary p. 205. **DWB**—The oceanographical observations were made in the sea east of Tohoku District on board the R.M.S. "Yushio-maru" during May 19 to June 8 and Aug. 27 to Sept. 10, 1952. The fluctuations of oceanic conditions were investigated by studying the distribution of water temperature, chlorinity, dissolved oxygen and currents. 1. The northward extension of the Kuroshio branches was not so remarkable during spring to summer in 1952, and a clock-wise circulation was observed, the center of which was at 39°30′N, 143°30′E and the velocity was about 0.7 kn at 40°30′N, 144°00′E in May, and it reached to 40°30′N, 144°30′E in summer and the velocity increased to about 2.0 kn near 40°30′N, 144°00′E. 2. During 1952 the Oyashio current and intermediate current reached more southward than in a normal year. 3. After passing off Shiriya-saki, the Tsugaru warm current was strongest since 1949, and the boundary between Oyashio current and Tsugaru warm current was observed at 143°30′E and the velocity was 0.9 kn in May, 143°40′E and 1.5 kn in Aug., the water mass which flows from the Gsugaru Strait was wider and thicker than in a normal year. *Subject Headings:* **1. Oceanographic observations 2. Ocean currents 3. Kuroshio Current 4. Oyashio Current 5. Japan.**—*Author's abstract.*

9D–54 551.511:551.465

Hidaka, Koji (*Geophysical Inst., Tokyo Univ.*), **Areas of divergence and convergence of wind stresses in the Pacific as the possible indicators of upwelling and sinking.** *I.U.G.G. Association of Physical Oceanography, Rome, Sept. 14–25, 1954, Procès-Verbaux.* Bergen, **1954.** p. 268. **DWB**—The distribution of wind stresses is computed from the wind roses given on the Pilot Chart of the U. S. Hydrographic Office. The divergence of wind stresses is then calculated all over this ocean and the areas of convergence and divergence are located. An area of divergence suggests the existence of upwelling, while that of convergence gives an indication that the sea water is sinking there.

Subject Headings: **1. Convergence and divergence 2. Upwelling 3. Wind stress 4. Pacific Ocean.** —*Author's abstract.*

9D–55 551.556:551.46

Hidaka, Koji (*Geophysical Inst., Tokyo Univ.*), **Zonal ocean currents driven by winds.** *I.U.G.G. Association of Physical Oceanography, Rome, Sept. 14–25, 1954, Procès-Verbaux*, Bergen, **1954.** p. 253. **DWB**—An ocean completely covering a rotating globe is assumed. A planetary wind distribution is then determined from actual data in the central region of the Pacific and a zonal oceanic circulation driven by this wind computed dynamically. The problem is two-dimensional and confined in a meridional plane. Zones of upwelling and sinking are also located. *Subject Headings:* **1. Wind driven currents 2. Oceanic circulation.**—*Author's abstract.*

9D–56 551.465(268)

Iselin, C. O'D. (*Woods Hole Oceanog. Inst.*), **Oceanographic problems of the Arctic Ocean.** *Arctic*, Montreal, 7(3/4):195–198, **1954.** 3 refs. **DLC**—In this review of the physical oceanography of the Arctic Ocean, the author discusses the circulation of the Arctic Ocean including the role of the Lomonsov Range and the existence of circulation to considerable depths in the absence of any significant supply of energy from the local winds, the characteristics of Arctic currents and the problem of maintaining Arctic expeditions for collecting observations. *Subject Headings:* **1. Ocean currents 2. Oceanic circulation 3. Arctic Ocean.**—*I.L.D.*

9D–57 551.465

LaFond, Eugene C. (*U. S. Navy Electronics Lab., Calif.*), **On the circulation of the surface layers off the east coast of India.** *I.U.G.G. Association of Physical Oceanography, Rome, Sept. 14–25, 1954, Procès-Verbaux.* Bergen, **1954.** p. 254–255. **DWB**—The fact of the existence of two seasonal water masses off the east coast of India differing by the density structure of the surface water layers—the less dense northern dilute water occurring about Oct. when approximately 10^{12} cm of fresh water are emptied into the northern part of the Bay of Bengal, and the much denser southern Bengal water occurring about March—are used to explain the horizontal and vertical circulations of the western Bay of Bengal. The surface diluted sea water confined to the coast by prevailing winds creates a southwesterly circulation and causes the sinking of heavier layers over the continental shelf. During spring, prevailing winds reverse and develop a circulation to the northeast and the denser southern Bengal water is brought into the area. A vertical range in water level of nearly two feet can be accounted for by seasonal changes in the vertical density of the two water masses, as well as by differences in atmospheric pressure from one side of the bay to the other. *Subject Headings:* **1. Oceanic circulation 2. Surface water density 3. Bay of Bengal, India.**—*A.M.P.*

9D–58 551.54:551.461.2

Lisowski, Konstanty, **Synopticzne warunki wezbrań sztormowych w ujsciach rzek południowego Bałtyku.** [Synoptic conditions of high water at river mouths of the Southern Baltic Sea during a storm.] *Przegląd Meteorologiczny i Hydrologiczny*, Warsaw, 6(3/4):114, 1953. pub. **1954. DWB**—After a brief survey of the theory of sea currents and of the genesis of sea swelling, the author discusses the influence of barometric lows on the water levels on the Baltic Sea and in river estuaries for two cases of high water (Nov. 7, 1936 and Jan. 8, 1937) and concludes that: 1) The highest waters in river estuaries of the southern coast occur during the passing of barometric lows along the paths 2 and 3 (according to VAN BEBBER and SCHINZ) over the Baltic; 2) the high water is caused by the rise of sea water levels produced by sea currents stirred by cyclonic winds, sea swelling and changes of atmospheric pressure; 3) the influence of wind on the sea level becomes appreciable only when the wind direction is perpendicular to the coast line; 4) atmospheric pressure changes during the passage of barometric depressions over the sea favor greatly the fluctuations of the sea level and highly influence, therefore, the rise of the swelling; the swerving of the sea level is in this case a dynamic adflection from the mean, depending on the speed of advance of the barometric low, the depth of the sea and the static deflection, as is shown by DOODSON and WARBURG's pattern (**Admiralty Manual of Tides,** London, **1941**). *Subject Headings:* **1. Sea currents 2. Swell 3. Pressure effects on sea level 4. Baltic Sea.**—*A.M.P.*

9D–59 550.376:551.465.018

Longuet-Higgins, M. S.; Stern, M. E. and Stommel, Henry, **The electrical field induced by ocean currents and waves, with application to the method of towed electrodes.** *Papers in Physical Oceanography and Meteorology*, Cambridge, Mass., 13(1), Nov. **1954.** 37 p. 28 figs., 12 refs., numerous eqs. "A preliminary draft titled: **Manual of examples of the electrical effects of different types of water motion in the ocean,** issued May **1952.**" **DWB**—The electrical field induced by different velocity distributions in the ocean is investigated by means of theory and measurements made by towed electrodes. Field produced by waves and tidal streams was predicted by FARADAY

in 1832, and measured in 1920 by GERRARD and JEVONS. The towed electrode method was first used by VON ARX (and others) in 1950 to detect water movements. The present paper reviews the entire subject in view of the misleading results of simple interpretation of limited movements (of the surface layer field) made by towed electrodes. One chapter (7) covers the field induced by sea waves. *Subject Headings:* **1. Ocean current effects 2. Electrical field in oceans 3. Towed electrodes 4. Wave effects on electric fields.**—*M.R.*

9D–60 532.61:551.46

Lumby, J. R. and Folkard, A. R. (*Fisheries Lab., Lowestoft*), **Variations in the surface tension of sea water *in situ*.** *I.U.G.G. Association of Physical Oceanography, Rome, Sept. 14–25, 1954, Procès-Verbaux.* Bergen, **1954.** p. 284–285. 2 refs. **DWB**—The methods and results of measuring the depression of surface tension in "slicks" (smooth areas on the sea surface) occurring as elongated streaks or irregular patches in rougher areas of the sea surface caused by the presence of organic leptopal are described. The study was carried out by a method described in 1937 by N. K. ADAM, directly at sea at Monaco. It has been found that in ruffled areas, the depression of surface tension was usually between 2 and 3 dynes/cm, while higher values, occasionally exceeding 22½ dynes/cm, were observed in the slicks. It is thought that in these instances of exceptionally high values, the greater part of surface contamination may have come from the land. *Subject Headings:* **1. Surface tension 2. Sea surfaces 3. Sea surface roughness.**—*A.M.P.*

9D–61 551.465

Maizuru, Japan. Marine Observatory. **Report of the oceanographical observations off San'in and Hokuriku, July–August 1952.** *Japan. Central Meteorological Observatory, Tokyo, Oceanographical Report,* 3(3):49–63, July **1954.** 13 figs., 2 tables. In Japanese; English summary, p. 49. **DWB**—In summer 1952, oceanographical observations were carried out off San'in and Hokuriku Districts in the Japan Sea. The outstanding features of the sea conditions in this season were summarized as follows: 1) The warm current flowed closely along the coast and its thickness was not so great. 2) Corresponding to the features above mentioned, the upwelling of the underlying waters was striking off Kasumi, Kyoga-misaki and Tateishisaki. This water mass was called "Noto Cold Water" and moves toward south off the west coast of Noto peninsula. 3) The variation of the state of sea was considered to be remarkable due to the up- and down-motion of the water mass. The vertical section off Kyoga-misaki was shown as the typical example. *Subject Headings:* **1. Oceanographic observations 2. Ocean currents 3. Sea of Japan.**—*Author's abstract.*

9D–62 532.59:778.38:551.465

Marks, Wilbur (*New York Univ., Dept. of Met. and Oceanog.*), **The use of a filter to sort out directions in a short-crested Gaussian sea surface.** *American Geophysical Union, Transactions,* 35(5):758–766, Oct. **1954.** 7 figs., 6 refs., 14 eqs. **MH-BH**—The method of stereo pairs may be used to obtain wave records which characterize the sea surface completely at any given place. The three-dimensional aerial photograph thus obtained is divided into $2N+1$ wave records spaced Δy ft apart. The $2N+1$ wave records are combined statistically into one wave record, and the energy spectrum for spectral components within a certain angular band is then computed. A filter function which depends on N and Δy is derived from the averaging process. The filter function operates on the energy spectrum in such a way that, for proper choice of N and Δy, the waves whose spectral directions are any other than that which is desired are eliminated. The energy spectrum which results is composed of the energy of those waves which travel in the desired direction. A sample example illustrates this process. *Subject Headings:* **1. Stereophotogrammetry 2. Ocean wave spectra.**—*Author's abstract.*

9D–63 551.465

*Masuzawa, Jotaro (*Central Met. Obs., Tokyo*), **On the Kuroshio south off Shiono-Misaki of Japan (Currents and water masses of the Kuroshio system, pt. 1).** *Oceanographical Magazine,* Tokyo, 6(1):25–33, Aug. **1954.** 7 figs., 2 tables, 8 refs. **MH-BH.** Also his **On the seasonal variation of the Kuroshio east off Cape Kinkazan of Japan proper (Currents and water masses of the Kuroshio system, pt. 2).** *Japan. Central Meteorological Observatory, Tokyo, Oceanographical Report,* 3(4):251–255, Dec. **1954.** 7 figs., 7 refs. In Japanese; English summary p. 251. **DWB**—These papers describe the seasonal variations of the Kuroshio south of Shiono-misaki (33°25′N, 135°45′E), and east of Cape Kinkazan in the eastern Sea of Japan, respectively. The data and cross-sections presented are based on observations obtained on the ocean weather ships of the Central Meteorological Observatory one or two times a month between 1949 and 1953. In the second paper it is shown that the Kuroshio warm waters appeared in two localities of the section east of Cape Kinkazan and the near shore branch showed the maximum and mean temperature in the upper layer in early winter and the minimum in spring, and the offshore branch moves westward in the period from summer to autumn. *Subject Headings:* **1. Seasonal variation of Kuroshio 2. Kuroshio Current**

3. Cape Kinkazan Region, Japan 4. Shionomisaki Region, Japan 5. Sea of Japan.—*M.R. and Author's abstract.*

9D–64 551.460.18

Pierson, Willard J., Jr., **Electronic wave spectrum analyzer and its use in engineering problems.** *U. S. Beach Erosion Board, Technical Memorandum*, No. 56, Oct. **1954.** 91 p. tables, numerous figs. and eqs., refs. **DWB**—The theory of the wave spectrum analyzer as designed and constructed by S. S. Chang (1954) is described and the operation of the filters in the analyzer explained theoretically. Methods for computing information on the free surface wave spectrum, the energy flux in the surf beats and in the waves and the average "period" are developed. A detailed example is carried out which shows interesting features of the waves. The techniques discussed should make it possible to obtain reliable data for waves and surf beat. The analyzer can also be used to study ship motion records and any other Gaussian processes. *Subject Headings:* **1. Wave spectrum analyzer 2. Ocean wave spectra 3. Surf beats.**—*From author's summary.*

9D–65 551.461.2

Polli, Silvio (*Talassographic Institute, Trieste*), **L'attuale aumento del livello del mare lungo le coste del Mediterraneo.** [Present increase in the height of the sea along the Mediterranean Coast.] *Geofisica e Meteorologia*, Genoa, 2(1/2):13–16, Jan./April **1954.** 2 tables, fig., refs. p. 16. **DWB**—The variation occurring in the mean sea level in the last 60 yrs is examined in 37 oceanographic stations of the Mediterranean. Successive increases for each ten year period have been noted at each station, resulting in the conclusion that the sea level increases on the average 1.5 cm every ten years. *Subject Headings:* **1. Sea level variations 2. Mediterranean Coast.**—*Author's abstract.*

9D–66 525.6

†Proudman, J. (*Pres. I.U.G.G. Assoc. of Physical Oceanography*), **Unknown tides of the oceans [presidential address].** *I.U.G.G. Association of Physical Oceanography, Rome, Sept. 14–25, 1954, Procès-Verbaux.* Bergen, **1954.** p. 83–91. bibliog. p. 90–91. **DWB**—Although Whewell in 1833 published charts showing co-tidal lines based on knowledge of tides along coasts, it is only recently that attempts have been made to construct charts showing co-ranges, or heights of tide over oceans. Work on North Sea, Irish Sea and English Channel (1924–31) led to more recent work, using the relaxation method for extrapolating by difference equations from coastal points in a grid to the center of the ocean. Barometric methods used by Barkow (1911) and Bartels (1926) have proven difficult and not successful. No instruments have yet been devised to measure the tide in the open sea. *Subject Headings:* **1. Tides in open ocean 2. Relaxation method.**—*M.R.*

9D–67 551.465(262)

Romanovsky, V. (*Centre de Recherches et d'études Océanog., Paris*), **Les courants marins de surface dans le Bassin Occidental de la Mediterranee.** [Ocean surface currents in the Western Basin of the Mediterranean.] *I.U.G.G. Association of Physical Oceanography, Rome, Sept. 14–25, 1954, Procès-Verbaux.* Bergen, **1954.** p. 256–257. **DWB**—Results of investigations of the direction, with some information on the speed of sea surface currents in the western basin, of the Mediterranean Sea carried out regularly twice a year (Jan. and March) by the release of bottles (since 1951) and vinyl chloride pouches (since 1953) are presented. They enable one to trace the paths and the speeds of the currents, from Gibraltar along the African coast to Bizerte, and along the European coast to Sardinia, beyond which it converges with the African current. *Subject Headings:* **1. Sea currents 2. Mediterranean Sea.**—*A.M.P.*

9D–68 551.465(265)

Sugiura, Jiro (*Hakodate Marine Observatory*), **On the transport in the sea area east of Sanriku from March to August 1950.** *Japan. Central Meteorological Observatory, Tokyo, Oceanographical Report*, 3(3):64–68, July **1954.** 5 figs., 2 refs., eqs. In Japanese; English summary p. 64. **DWB**—The volume transports were calculated, based on oceanographical observations taken in the sea area east off Sanriku from March to Aug. 1950. In those months, the transports of Kuroshio extension amount to about 23–44 million cu m/sec, and those of Oyashio 2–6 million cu m/sec. A large clockwise vortex of Kuroshio water was found off Onahama from March to June, but in July and Aug. this vortex disappeared. A moderate clockwise vortex of Kuroshio water was found off Hachinohe from April to Aug. *Subject Headings:* **1. Oyashio Current 2. Kuroshio Current 3. Ocean currents 4. Pacific Ocean.**—*Author's abstract.*

9D–69 551.47

Sverdrup, Harald U., **The currents of the coast of Queen Maud Land.** *Norsk Geografisk Tidsskrift*, Oslo, 14(1/4):239–249, **1953.** 5 figs., 4 refs. Reprinted as *Norsk Polarinstitutt, Meddelelse*, No. 75, **1954. DWB, DLC** (G1.N6)—The "coast" of Queen Maud Land is generally formed

by floating shelf ice which is about 200 m thick whereas the depth to the bottom is 300 to 400 m. The prevailing wind blows parallel to the coast, towards the west. The wind current transports the low salinity, about 50 m thick surface layer towards the coast where it must descend. Therefore, directly off the shelf ice, we find low salinities to a depth of more than 200 m. In summer, when the surface layer has a temperature about zero degree, the water that sinks close to the shelf has a temperature that lies from 0.5° to 1.0° above freezing point. The question of melting at the bottom of the shelf ice is examined. The conclusion is that such melting may take place, but it cannot account for the nearly similar thickness of different ice shelves. *Subject Headings:* **1. Ocean currents 2. Queen Maud Coast Antarctica.**—*Author's abstract.*

9D–70 551.465(261)

Tait, John B. (*Scottish Home Dept., Marine Lab., Aberdeen*), **Variations in the strength of the Atlantic Current in the Faroe-Shetland Channel.** *I.U.G.G. Association of Physical Oceanography, Rome, Sept. 14–25, 1954, Procès-Verbaux.* Bergen, **1954.** p. 258–259. **DWB**—Quantitative measurements of the Atlantic current between the Butt of Lewis and Faroe bank in the form of volume transport computation have been made in some twenty instances between 1927 and 1952, by the marine hydrodynamical method from Bjerknes's circulation theorem and by similar computations along an approximately parallel hydrographic section between the Faroe Islands and Shetland. In all cases remarkably close agreement has been achieved. They show not only enormous translations of oceanic water northwards, but also very large fluctuations in its intensity between roughly corresponding periods of different years and also, and no less, between different seasons of the same year. Autumn-winter intensities often greatly exceed those of the previous and/or following spring seasons. *Subject Headings:* **1. Atlantic Current 2. Oceanic circulation 3. Faeroe Islands 4. Shetland Channel.**—*A.M.P.*

9D–71 910.45:551.465(267)

Thomson, J. P. and Barlow, E. W., **Drift of the *San Ernesto* 1943–49.** *Marine Observer*, 24(164): 82–83, April **1954.** fig. **DLC**—Ship torpedoed in S. Indian Ocean in June 1943, was reported in June 1949 aground on Pulau Nias Is. in 1°15′N, 97°15′E. Possible drift under prevailing winds and currents shown. *Subject Headings:* **1. Ocean currents 2. Indian Ocean.**—*C.E.P.B.*

9D–72 551.461.2(261.2)

Valentin, Hartmut, **Gegenwärtige Niveauveränderungen im Nordseeraum.** [Present changes of level in the North Sea area.] *Petermanns Geographische Mitteilungen*, 98(2):103–108, **1954.** 2 figs. chart, table, refs. **DLC**—Changes of level show a land rise up to 4 mm a year in Scotland and 10 mm/yr in Fennoscandia and fall of 2 mm/year in English Channel and 3–4 mm/yr in Baltic. Main causes are tectonic dating back to Tertiary, strengthened by recovery from Quaternary ice load. Glacial retreat in past 100 years has caused a rise of sea level by 1–2 mm/yr. Changes of atmospheric and oceanic circulation may have caused unimportant changes of sea level. *Subject Headings:* **1. Sea level variations 2. North Sea.**—*C.E.P.B.*

9D–73 532.59:551.46

*Wiegel, Robert L., **Gravity waves: tables of functions.** Berkeley, Calif. Council on Wave Research, Engineering Foundation, **1954.** 30 p. almost entirely tables, 8 refs. **DLC**—Useful tables for oceanographers, hydrographers and engineers, for calculating wave parameter when the depth (d), wave length (L) or period (T) are known. Detailed tables of d/L for even increments of d/L_0 for shallow and for deep water, respectively, functions of the relative depth, etc., as explanations of the tables, and a nomogram giving wave parameters (height, length, velocity, angle of crest with bottom, depth, pressure response factor at bottom, fraction of wave energy advancing with wave velocity, for shallow and deep water conditions) are presented. *Subject Headings:* **1. Wave parameter tables 2. Oceanographic tables.**—*M.R.*

9D–74 551.46

Wiegel, R. L.; Patrick, D. A. and Kimberley, H. L. (*all, Univ. of Calif.*), **Wave, longshore current, and beach profile records for Santa Margarita River Beach, Oceanside, California, 1949.** *American Geophysical Union, Transactions*, 35(6):887–896, Pt. 1, Dec. **1954.** 7 figs., table, 14 refs., 2 eqs. **MH-BH**—The results of ten months of measurements of waves, longshore currents, and beach conditions for Santa Margarita River Beach are presented. Tables and graphs give the height, period, and steepness of the incident waves as measured by a subsurface, differential-type pressure recorder; breaker heights as computed from these data; observed wave directions; longshore current measurements, both magnitude and direction, as obtained by tracing dye thrown into the water; and bench profiles measured along three ranges 500 ft apart from the berm to a depth of about 25 ft. It was found that the three sets of profiles were not consistent in regard to their relationship with varying wave conditions, and further that the type of beach profile (storm or ordinary)

apparently did not bear the same relationship to the wave steepness has been found in laboratory studies. *Subject Headings:* **1. Wave periods 2. Wave heights 3. Wave erosion 4. Beach wave profiles 5. Santa Margarita River Beach, Oceanside, Calif.**—*Author's abstract.*

1955

9D–75 532.59:551.543

*§Bossolasco, Mario, **Alcuni caratteri del moto ondoso e la mareggiata eccezionale nel golfo di Genova del 19 Febbraio 1955.** [Some types of wave motion and the exceptional tide in the Gulf of Genoa on Feb. 19, 1955.] *Geofisica e Meteorologia*, Genoa, 3(6):131–138, Nov./Dec. **1955.** 4 figs., table, 8 refs., eqs. **DWB**—In a discussion of the various modes of ocean wave motion, the importance of converging winds in the formation of waves is stressed. Since the convergence or divergence of wind is reflected in the pressure tendency, this latter may be used for predicting wave activity. The relation of pressure tendency to wave activity is discussed with particular reference to the Gulf of Genoa. The exceptional swell of Feb. 19, 1955 is described in connection with the synoptic development over the Gulf. A synoptic chart showing three-hourly pressure development on that day is presented. *Subject Headings:* **1. Wave motion 2. Wave formation 3. Pressure tendencies 4. Ocean swell 5. Gulf of Genoa.**—*G.T.*

9D–76 551.465

Bowden, K. F., **Some observations of turbulence near the sea bed in a tidal current.** *Royal Meteorological Society, Quarterly Journal*, 81(350):640–641, Oct. **1955.** 4 refs. Disc. p. 641–642. **DWB**—Summary of a paper describing observations with an electromagnetic flow meter off Anglesey. Correlations between velocity components at different levels are listed. *Subject Headings:* **1. Turbulence in tidal flow 2. Anglesey, Wales.**—*C.E.P.B.*

9D–77 532.59:551.465

California. Univ. Scripps Institution of Oceanography, **Study of long-period waves by instruments which record on ship.** Contract AF 19(604)-1163, Final Report, Aug. 15, **1955.** 8 p.— This contract has sponsored a study of ocean waves of periods of 2 min to 2 hrs and of small amplitudes. The work has resulted in a paper, **Edge waves on the continental shelf,** by Walter Munk, Frank Snodgrass, and George Carrier (*see* 7J–191, Oct. 1956, *MAB*). During the final quarter of work under the contract two sea trips were made to obtain measurements of long-period wave activity on the continental shelf. Two conclusions were reached: 1) there is a marked distinction between waves of periods less than 5 min and more than 10 min, the waves of periods of less than 5 min roughly agreeing, with regard to amplitude ratios, with conventional shallow-water theory; 2) the 10- to 30-min waves seem to be quite a different phenomenon, the observed amplitude ratios being in general agreement with those given by edge-wave theory. An attempt was made to generate edge waves by having a destroyer run at full speed for one hour along a relatively straight beach. No measurable edge wave was generated. *Subject Headings:* **1. Ocean wave periods. I. Munk, W. II. Snodgrass, F. III. Carrier, G.**—*Author's abstract.*

9D–78 525.6:551.465

Chew, Frank (*Marine Lab., Univ. Miami, Coral Gables, Fla.*), **On the offshore circulation and a convergence mechanism in the red tide region off the west coast of Florida.** *American Geophysical Union, Transactions*, 36(6):963–974, Dec. **1955.** 10 figs., 2 tables, 17 refs., 15 eqs. **DWB, DLC**— The offshore water is shown to move as a single column. The sloping bottom and the equation of continuity are then applied to show the existence of a horizontal convergence mechanism which, over a period of several weeks, may effect a several-fold increase in concentration of floating particles. The southbound current in the "loop" is thought of as a Rossby jet which drives the cyclonic eddy offshore. Consideration of the abbreviated vorticity equation, together with the fact of sloping bottom, show that the southeastern quadrant of the cyclonic eddy possesses increasing negative vorticity and hence the organisms previously concentrated will tend to wash ashore. Some consideration of the effects of wind are also included. *Subject Headings:* **1. Red tide structure 2. Offshore circulation 3. Florida West Coast.**—*Author's abstract.*

9D–79 532.59:551.46

De, S. C., **Contributions to the theory of Stokes waves.** *Cambridge Philosophical Society, Proceedings*, 51(4):713–736, Oct. **1955.** 2 figs., 3 tables, 11 refs., 74 eqs. **DWB**—The Stokes theory of waves of permanent form in water of finite depth is extended. Expressions for volume flow rate, energy per unit mass, and momentum flow rate, corrected for pressure forces and divided by density, have been obtained to 5th order and used to calculate the ratios of mean depth and wave height to wavelength. Recent work by Benjamin and Lighthill is further considered. *Subject Heading:* **1. Wave mechanics.**—*From author's abstract.*

9D–80 551.465

Fuglister, F. C., **Alternative analyses of current surveys.** *Deep-Sea Research*, London, 2 (3) :213–229, April **1955.** 5-charts, 7 refs. **DWB**—Ocean current nomenclature, with respects to average and instantaneous currents, is discussed. Temperature data from the Gulf Stream system, obtained in 1948, 1951 and 1953, and from the Kuroshio system in 1933 are analyzed with alternative points of view. A 1954 survey of a portion of the Gulf Stream system substantiates the analyses which show relatively small scale structure in these current systems. *Subject Heading:* **1. Ocean currents.** —*Author's abstract.*

9D–81 551.465

Fukuoka, Jiro (*Cent. Met. Obs., Tokyo*), **Variation of the [ocean] polar front in the sea adjacent to Japan.** *Oceanographical Magazine*, Tokyo, 6 (4) :181–195, Jan. **1955.** figs., 7 refs., eqs. **DWB**—The variations in the "Shiozakai" or the convergence line between the warm and cold currents (sea water temp. gradient >4°C/30 m) are closely allied with northward and southward movements of the Kuroshio. The author shows these variations by means of charts giving the frequency of Shiozakai location within 1° sq. of lat. and long. by seasons (Jan.–March and April–June) for the separate years 1950, 1951, 1952 and 1953. In 1953, the Shiozakai was farther south than usual. Relations with T-Cl soundings, sea level variations and wind stress are also discussed and illustrated. *Subject Headings:* **1. Shiozakai 2. Oceanic polar front 3. Kuroshio-Oyashio Region.**—*M.R.*

9D–82 551.465

†Guilcher, André, **Sur l'hydrologie du Pacifique équatorial et nordoccidental.** [Hydrology of the equatorial and Northwest Pacific.] *Annales de Géographie*, Paris, 64 (342) :81–96, March/April **1955.** 7 figs., numerous foot-refs. **DLC**—The author reviews the recent literature (since 1947) on the Pacific currents in the central eastern equatorial region and in the vicinity of Japan. The author discusses with the aid of diagrams, equatorial and north equatorial divergence, intermediary convergence, the west-east counter currents, extension and relation of currents in depth, origin of equatorial currents, the oscillation of the oceanic polar front from E.N.E. of Honshu and Kuroshio, Oyashio and the intermediary water southeast and east of Japan. *Subject Headings:* **1. Ocean currents 2. Equatorial hydrology 3. Equatorial ocean currents 4. Japan 5. Northwest Pacific.** —*I.L.D.*

9D–83 551.556.81 :551.515 :525.63

Hansen, Walter, **Elevation of sea level caused by wind in a rectangular channel.** *Papers in Marine Biology and Oceanography*, Suppl. to Vol. 3 of *Deep-Sea Research*, pub. **1955.** p. 435–437. 2 figs., 4 refs. **DLC**—Theoretical calculations of rise of water level due to wind in a rectangular basin are compared with actual data on maximum elevation of the storm surge of Jan. 31, 1953 as determined by Rossiter (*see* 6C–118, March 1955, *MAB*). Calculated values of +2.0 m were obtained for the S.W. corner of the quadrangle which was fitted into the North Sea, whereas actual set up was +1.8 to +2.4 m in this area. Computed values for the rest of the area were reasonably close to the observed. *Subject Headings:* **1. Wind effects on sea level 2. Storm surge, North Sea (Feb. 1953) 3. North Sea.**—*M.R.*

9D–84 551.465

Hayami, Shoitiro; Kawai, Hideo and Ouchi, Masao (*all, Geoph. Inst., Kyoto Univ.*), **On the theorem of Helland-Hansen and Ekman and some of its applications.** *Records of Oceanographic Works in Japan, Tokyo, n.s.*, 2 (2) :56–67, Oct. **1955.** 9 figs., 2 tables, 8 refs., 31 eqs. **DWB**—The theorem of Helland-Hansen and Ekman, which is also known as the law of parallel solenoids, is outlined and interpreted in a mathematical form for application to the problem of calculating the absolute velocity of a current without knowledge of the level of zero velocity (grad D.), and extended to computation of the volume transport of the Kuroshio for Aug. 2–21, 1938 off southern Japan to a depth of 1000 decibars. It was estimated to be 6.5×10^7 m^3/sec for the period of observation. Finally, the internal dynamics of an ocean current are discussed. *Subject Headings:* **1. Dynamics of ocean currents 2. Helland-Hansen and Ekman theory 3. Kuroshio Current.**—*M.R.*

9D–85 551.465

Hidaka, Kôji (*Tokyo Univ.*), **Divergence of surface drift currents in terms of wind stresses, with special application to the location of upwelling and sinking.** *Japanese Journal of Geophysics*, Tokyo, 1 (2) :47–56, May **1955.** 2 figs., table, 14 refs., 27 eqs. **DWB**—Assuming that wind action is responsible for most of the upwelling and sinking of surface waters of the oceans, expressions are derived which when negative indicates convergence and sinking, and when positive, divergence and upwelling. Using these equations, computations are made from data published in the U. S. Hydrographic Office Pilot Charts for the entire Pacific Ocean from 50°S to 50°–60°N, and the results shown on a Mercator Chart which presents not only areas of convergence and divergence but degree

(in intervals of 25 or 50 mg/m³/sec). Chart shows strong divergence near equator (becoming infinite at equation, sad to say), and two other belts of divergence (upwelling) in sub-Arctic latitudes. Convergence occurs in mid-latitudes far from shore. *Subject Headings:* **1. Divergence of ocean currents 2. Upwelling 3. Pacific Ocean.**—*M.R.*

9D–86 551.465.018

Hidaka, Kôji (*Tokyo Univ.*), **Dynamical computation of ocean currents in a vertical section occupied across the equator.** *Japanese Journal of Geophysics*, Tokyo, 1(2):57–60, May **1955.** 5 refs., 8 eqs. **DWB**—The difficulty encountered, in using the Bjerknes-Helland Hansen formula for calculating the speed of the geostrophic current, when approaching the equator where the denominator $2\omega \sin \phi L$ is 0, is avoided by using an equation derived by differentiating both sides of the Bjerknes equation with respect to ϕ (lat.) and put $\phi = 0$. *Subject Headings:* **1. Geostrophic ocean current computations 2. Equatorial ocean currents.**—*M.R.*

9D–87 551.465

Hidaka, Kôji and Akiba, Yoshio, **Upwelling induced by a circular wind system.** *Records of Oceanographic Works in Japan, Tokyo, n.s.*, 2(1):7–18, March **1955.** 6 figs., 7 tables, 5 refs., 38 eqs. **DWB**—A theory of upwelling induced by a circular wind system is worked out. Assuming a simple distribution of wind stresses and taking the effect of Coriolis forces and both horizontal and vertical mixing into account, the hydrodynamical equations are solved. The results show that in the case of cyclonic wind system, upwelling is induced by convergent wind as well as divergent wind. The velocity of upwelling depends upon the angle between the wind direction and the direction of tangent to the circle. And in case of convergent wind, the wind system which has small angle is more effective for the upwelling. It is also shown that vertical circulation occurs in a wide region in r-z plane and vertical variation of horizontal currents is similar to Ekman spiral. *Subject Headings:* **1. Upwelling.**—*Authors' abstract.*

9D–88 551.556:551.465

Hidaka, Kôji (*Tokyo Univ.*), **Wind circulation in a two-layer zonal ocean.** *Japanese Journal of Geophysics*, Tokyo, 1(2):33–45, May **1955.** 2 figs., 3 tables, 10 refs., 34 eqs. **DWB**—Integral equations are worked out to represent the relation between wind stresses, pressure distribution and currents in a two-layer zonal ocean. By assuming a definite density value for each of the 2 layers, the currents, slopes of the sea surface and the boundary layer are determined. Numerical results are computed for each 5° of lat. from 2.5°N to 42.5° for the N. Pacific, showing current components for each 10 m from the surface to the bottom (600 m depth) using average data for 8 meridians from 142.5°W to 177.5°W. Results are given in tables and on hodographs, the general flow of water is in the direction of the wind stress, and no equatorial countercurrent appears. Conclusion is that a simple 2 layer zonal model will not account for complicated flow in equatorial region. *Subject Headings:* **1. Wind driven currents 2. Equatorial counter current 3. North Pacific.**—*M.R.*

9D–89 551.465

Ichiye, Takashi (*Central Met. Obs. Tokyo*), **On the possible origin of the intermediate water in the Kuroshio.** *Records of Oceanographic Works in Japan*, Tokyo, n.s., 2(2):82–89, Oct. **1955.** 5 figs., 2 tables, 10 refs., 2 eqs. **DWB**—The theory, that the low salinity waters at intermediate depths under the Kuroshio originated in the cold Oyashio waters which sank and were transported by a counter current at the bottom of this Kuroshio intermediate zone, is held untenable since soundings to 300–1000 m (36 sections Aug. 1951 to Nov. 1953, and synoptic observations in Aug. 1954) show no such counter current. This water would be mixed with high salinity surface water if there were no constant supply in the southerly regions. Lateral mixing is shown to have an important role in this phenomenon. *Subject Headings:* **1. Kuroshio intermediate water 2. Kuroshio Current.**—*M.R.*

9D–90 551.465(263)

Iselin, C. O'D. (*Woods Hole Oceanog. Inst.*), **Recent advances in our understanding of the circulation problem and their implications.** *Journal of Marine Research*, New Haven, Conn. 14(4):315–322, **1955. DWB, DLC**—The studies of the circulation discussed by the author refer primarily to those carried out at the Woods Hole Oceanographic Institute since 1931. These include the early application of the geostrophic equation to oceanic temperature and salinity data, study of the Gulf Stream profiles, study of the Gulf Stream with the aid of the bathythermograph. Operation Cabot and the origin of FUGLISTER's multiple current hypothesis of the Gulf Stream circulation, variation of velocity with depth and the development of bathypitometers (WILLEM V. R. MALKUS), model studies of the oceanic circulation (VON ARX), measurement of the variations of energy in the Gulf Stream (WERTHEIM), etc. are discussed. *Subject Headings:* **1. Oceanic circulation 2. Gulf Stream.**—*I.L.D.*

9D–91 551.556:532.593

Ivanov, A. A., **Izmenchivost' vetrovykh voln moreĭ i okeanov.** [The variability of wind waves in seas and in oceans.] *Akademiia Nauk SSSR, Izvestiia, Ser. Geofiz.*, No. 6:557–560, Nov./Dec. **1955.** 3 figs., table, 4 refs. **DLC**—The author examines critically the views of E. M. Selinek (*Leningrad. Gosudarstvennyĭ Gidrologicheskiĭ Institut, Trudy*, No. 22(76), **1950**) and A. P. Morozov (*Moscow. Gosudarstvennyĭ Okeanograficheskiĭ Institut, Trudy*, No. 23, **1953**) that wave characteristics are random phenomena that correspond to the Pearson type-1 or the binomial distribution. The application of the Pearson curves to a study of the wave period coefficient of variability and asymmetry, etc. and the application of the binomial theorem to various wave parameters is treated. It is concluded that these procedures to a study of wind waves are ill founded and invalid. *Subject Headings:* **1. Wind wave variability 2. Wind wave theory.**—*I.L.D.*

9D–92 551.461.2(489)

Jessen, Axel (*Inst. of Geodesy, Copenhagen*), **Nivellement hydrographique entre six stations danoises.** [Hydrographic levelling among six Danish stations.] *Tellus*, Stockholm, 7(3):381–384, Aug. **1955.** 3 figs., 4 refs., table, eqs. **DLC**—The annual means of sea-level are considered as consisting of two independent quantities: the height of the zero point in question and the height of the water-surface. An attempt is made to separate these two quantities. The result is a set of diagrams showing the relative secular motion of the zero points and the sea-level. *Subject Headings:* **1. Sea level variations 2. Denmark.**—*Author's abstract.*

9D–93 532.59:551.46.018

Kokoulin, P. P., **Metodika nabliudeniĭ nad volneniem na Tsimlianskom vodokhranilishche.** [Method of observation of swell in the Tsimliansk water reservoir.] *Meteorologiia i Gidrologiia*, Leningrad, No. 5:52–56, Sept./Oct. **1955.** 5 figs., eq. **DWB, DLC**—The author describes the construction and operation of electric contact spar buoys, maximum-minimum wave measuring spar buoy and an automatic wave recorder of all wave elements. The several devices, which can be used in relatively large bodies of water since they are installed on spar buoys, are shown diagrammatically. *Subject Headings:* **1. Ocean swell recorders 2. Wave recorders.**—*I.L.D.*

9D–94 532.593:551.465

Long, Robert R., **On the solitary wave.** Johns Hopkins Univ. Dept. of Civil Engineering, Contract N-onr-248(31), Project NR 082-104, Technical Report, No. 4, June **1955.** 21 p. 3 figs., table, 14 refs., 67 eqs. **DWB**—The theory of the solitary wave is reviewed in detail and a table calculated and presented for determining the speed of a solitary wave with a high degree of accuracy (for values of $\alpha < .30$) or a reasonable accuracy for values up to 0.45. A graph shows relationship between F^2 and α using several formulas. F^2 is the Froude number, $\alpha = a/h$ where a is height of crest above h, the depth of water. *Subject Headings:* **1. Solitary wave theory 2. Wave speed calculation. I. Johns Hopkins Univ. Dept. of Civil Engineering.**—*M.R.*

9D–95 525.6:551.465

Maloney, W. E. (*U. S. Hydrographic Off., Div. of Oceanog.*), **Some oceanographic results of the Odyssey.** *Scientific Monthly*, N. Y., 80(4):250–251, April **1955.** 2 photos. **DWB**—The author presents a semi-fanciful account of the experiences of Ulysses (Odysseus) in the "Scylla and Charybdis" region of the Mediterranean, which he identifies with the Straits of Messina that separate Italy from Sicily. The legendary sucking in and spouting out of the waters of the Strait near Charybdis are accounted for by the tidal currents which are sensational in that strait. The Mediterranean is separated into two basins, so that when it is high tide on one side of the straits it is extreme low on the other and vice versa—hence the surge of water through the bore at extreme tide. At mean tide, as Circe told Ulysses, the water is calm and a ship can pass through. *Subject Headings:* **1. Tidal currents 2. Straits of Messina 3. Mediterranean Sea.**—*M.R.*

9D–96 551.465(27)

Masuzawa, Jotaro and Nakai, Toshisuke (*Central Met. Obs., Tokyo*), **Notes on the cross-current structure of the Kuroshio (Currents and water masses of the Kuroshio system, Pt. 5).** *Records of Oceanographic Works in Japan, Tokyo, n.s.*, 2(2):96–101, Oct. **1955.** 8 figs., 10 refs. **DWB**—Typical sections of the Kuroshio system of Japan show the "cold wall," the "warm core" and the "cold low" salinity water as found in Gulf Stream by Dietrich (1937), Fuglister and Worthington (1951), and Ford and others (1952), as shown by cross sections obtained by the "Ryofu-Maru" off the coast of Japan in the Kuroshio area. The extremely cold low salinity water was not, however, found in the Kuroshio. *Subject Headings:* **1. Oceanographic sections 2. Ocean current structure 3. Kuroshio Current.**—*M.R.*

9D–97 551.465(265)

*Masuzawa, Jotaro (*Central Met. Obs., Tokyo*), **Preliminary report on the Kuroshio in the Eastern Sea of Japan.** [**Currents and water masses of the Kuroshio system, pt. 3.**] *Records of Oceanographic Works in Japan, Tokyo, n.s.*, 2(1):132–140, March **1955.** 5 figs., table, 14 refs. **DWB** and: **An outline of the Kuroshio in the Eastern Sea of Japan (idem, pt. 4).** *Oceanographical Magazine*, Tokyo, 7(1):29–47, June **1955.** 20 figs., 2 tables, 26 refs. **DLC**—The oceanographic conditions in the eastern Sea of Japan have been investigated in order to obtain one of the methods for predicting the weather in summer which influences the rice-crop in northeast Japan and also to find good fishing grounds. The most systematic observations were carried out by the cooperation of many research-ships belonging to the Fishery Authorities in Japan from 1933 to 1941. From these observational data, general features on the Kuroshio and the Oyashio in this region has been made fairly clear by Uda (1935, 1938a, 1938b) and others. Recently Y. Saito (1952) analyzed in detail water masses in the North Pacific and interpreted their mixing in the frontal zone between the Kuroshio and the Oyashio. After World War II, the sectional observation along the so-called "C-line" east off Kinkazan (lat. 38°15′N) was carried out on board weather ships of the Central Meteorological Observatory almost twice a month from 1948 to 1953. These continuous observations show frequently rapid changes of the sectional distribution of different water masses in the shorter period and also several kinds of seasonal fluctuation of the Kuroshio and the Oyashio appeared in this section (Nannichi, 1951; Fukuoka, 1953; Ichiye, 1953 and Masuzawa, 1954). In Pt. 4 the horizontal current patterns, the branching of the Kuroshio, sectional current profiles, special velocity profiles, warm eddies, cold eddies, seasonal and other fluctuations of the surface water temperature, etc. are discussed and illustrated by profiles, dynamic topography charts and other schematic charts. *Subject Headings:* **1. Kuroshio Current 2. Oyashio Current 3. Oceanographic data 4. Sea of Japan.**—*Author's abstract and M.R.*

9D–98 551.46.018

Middleton, Foster H. (*Johns Hopkins Univ.*), **An ultrasonic current meter for estuarine research.** *Journal of Marine Research*, New Haven, Conn., 14(2):176–186, Oct. **1955.** 5 figs. (incl. photos), 4 refs. **DWB, DLC**—An instrument that measures the velocity and direction of water flow in estuaries is described. The magnitude is obtained by measuring the phase lag or advance, caused by motion of the water, in an ultrasonic wave. The instrument can be towed or suspended from a vessel or operated unattended at a remote station for a week. *Subject Heading:* **1. Current meters.**—*Author's abstract.*

9D–99 551.461.2:551.556

Miyazaki, Masamori (*Kobe Marine Obs.*), **Seasonal variations of the sea level along the Japanese coasts.** *Records of Oceanographic Works in Japan, Tokyo, n.s.*, 2(3):1–8, Oct. **1955.** 8 figs., table, 4 refs. **DWB**—Sea level along Japanese coasts rises in summer and autumn and falls in winter and spring, with an annual range of 20 to 40 cm. Dynamic effects of wind, ocean currents and general atmospheric circulation at sea as well as local effects of wind, rain, evaporation, pressure, etc. and wind produced anomalies are shown by graphs comparing levels at pairs of stations having differing exposure. Other anomalies are discussed. Harmonic components have been computed for more than 60 stations but with insufficient data. The author has recomputed these components using 15–36 years of data. Year-to-year variations are appreciable. *Subject Headings:* **1. Sea level variations 2. Wind effects 3. Weather anomalies 4. Japan Coast.**—*M.R.*

9D–100 551.460.18.3

Nan'niti, T. (*Met. Res. Inst.*), **On the structure of ocean currents, Pt. 1, Test manufacture of a new current meter and some experiments on the sea.** *Papers in Meteorology and Geophysics*, Tokyo, 5(3/4):248–252, Jan. **1955.** 5 figs., 3 tables, 4 refs. **DWB**—The author made a new current meter using a phototube and observed many interesting facts with it but it was too expensive to use. The author has made another and simpler current meter which will record current speed fluctuations more minutely but directions more roughly than the former. With it he observed ocean currents. *Subject Heading:* **1. Current meters.**—*Author's abstract.*

9D–101 537.37:551.465

Olsson, B. H., **Electrical effects of tidal streams in Cook Strait, New Zealand.** *Deep-Sea Research*, London, 2(3):204–212, April **1955.** 7 figs., 5 refs. **DWB**—Electric currents which are generated by tidal streams have been observed in the land near the coast of Cook Strait, New Zealand. In each tidal period, the vector representing the horizontal component of the potential gradient was found to rotate through 360° in a counter-clockwise direction. Corresponding rotary streams were observed in the Strait. The potential gradient associated with those streams which are directed along the channel is explained by the theory worked out by Longuet-Higgins (1949). No theory is available for dealing with on-shore streams. Using the potential-gradient measurements, the

magnitudes of those streams directed along the channel were computed. These computed values agree with certain direct observations of the streams made by the survey vessel H.M.N.Z.S. "Lachlan." *Subject Headings:* **1. Electrical effects of tidal currents 2. Cook Strait, New Zealand.**—*Author's abstract.*

9D–102 551.556:551.465:551.509.39(02)

†*Pierson, Willard, J., Jr.; Neumann, Gerhard and James, Richard W., **Practical methods for observing and forecasting ocean waves by means of wave spectra and statistics.** *U. S. Hydrographic Office, H.O. Publication*, No. 603, **1955.** 284 p. numerous figs. and tables, bibliog. p. 281–284. 4 enl. charts in pocket. "Original Forecasting Manual was prepared in 1953" (*see* 5K–174, Nov. 1954, *MAB*). Review by C. L. Bretschneider in *American Geophysical Union, Transactions*, 38(2):264–266, April **1957.** Also comments (on review) by W. H. Munk, G. Neumann and Willard J. Pierson, Jr., *Ibid.*, 38(5):778–781, Oct. 1957. **DWB**—The detailed and well illustrated manual covers: 1) properties of waves, sea and swell (records, definitions, amplitude, height, periods and lengths); 2) forecasting and theory of generation, spectra, etc.; 3) wave propagation and forecasting swell waves, filters, waves from several storms, forecast nomograms for dispersion, sample forecasts, viscosity effects; 4) wave observation techniques; 5) synoptic forecasting and analysis; 6) wave refraction; 7) operational applications for ships and planes operating from carriers or from sea; 8) verification of forecasts. Major changes have been made in Ch. 1, 2, 3, 7 & 8. *Subject Headings:* **1. Ocean wave forecasting manuals 2. Ocean wave theory.**—*M.R.*

9D–103 551.46

*Polli, Silvio, **Livelli marini estremi registrati nell'Adriatico settentrionale.** [Sea level extremes in the northern Adriatic.] *Archivio di Oceanografia e Limnologia*, Rome, 10(1/2):29–46, **1955.** 2 figs., numerous tables, 17 refs. Italian and English summaries, p. 45–46. **DLC.** Also issued as *Trieste. Istituto Sperimentale Talassografico, Pubblicazioni*, No. 320, **1955.**—Values of highest and lowest heights reached by the sea-level, in the following stations and years, are reported: Vieste, 1920–41; Ancona, 1920–40; Brondolo, 1926–34; Diga Sud Chioggia, 1936–50; S. Felice di Chioggia, 1912–33; Botte Trezze, 1936–42; Conche, 1924–34; Faro Rocchetta, 1918–46; Diga Sud Lido, 1920–50; Punta della Salute (Venezia), 1929–50; Porto Industriale di Marghera, 1929–46; Pagliaga, 1924–46; Valle Doga, 1945–48; Falconera, 1924–34; Porto Lignano, 1936–50; Marano Lagunare, 1929–42; Grado, 1930–44; Belvedere, 1936–49; Trieste, 1905–50; Pola, 1919–21. Factors influencing sea levels are discussed. *Subject Headings:* **1. Sea level variations 2. Adriatic Sea.**—*Author's abstract.*

9D–104 551.461.2:525.6

Polli, Silvio, **Variazioni delle costanti armoniche delle maree col livello del mare.** [Variation of the harmonic constants of the tides with sea level.] *Annali de Geofisica*, Rome, 8(2):201–207, April **1955.** 4 tables, bibliog. p. 207. English summary p. 206–207. **DLC**—The variation of the harmonic constants of the tides of six stations of the Adriatic, the Tyrrhenian and the Ionian seas versus the dependence of the contemporary variations of the mean marine level is described. Increases and decreases of almost 1° in the place angle (phase retard) and of about 1 mm in the amplitude (H) of the principal components of the tide have been found. *Subject Headings:* **1. Tides 2. Harmonic constants 3. Sea level variations.**—*Author's abstract.*

9D–105 551.46.018:532.593

Prusenkov, A. S., **Opyt primeneniia volnomera-perspektometra R. N. Ivanova dlia izmereniia morskikh voln i techenii u poberezh'ia.** [The application of the R. N. Ivanov wave-meter-perspectometer for measuring ocean waves and currents near coasts.] *Meteorologiia i Gidrologiia*, No. 2:39–40, March/April, **1955.** 3 tables. **DLC**—The measurements of heights of waves made with the wave-meter perspectometer and with a theodolite were compared. Also the velocity of spread and length of the waves was measured with both instruments. Improvements in the construction of the perspectometer to obtain greater accuracy are suggested. *Subject Headings:* **1. Wave meters 2. Perspectometers.**—*I.L.D.*

9D–106 551.465:551.501.81

Robson, R. (*Melbourne & Metropolitan Board of Works*), **Radar methods in ocean current detection.** *Commonwealth Engineer*, Melbourne, 42(6):219–225, Jan. **1955.** 8 figs. (incl. photos). **DLC**—Many methods of observing, measuring or calculating ocean currents are outlined and the latest method developed by the Melbourne Board of Works for study of Bass Strait currents near Cape Schanck, Victoria, namely radar observation of an elevated reflecting screen on a floating target, is described in detail. The method is cheap, efficient (not affected by rain, darkness or fog), reliable (easier to locate than visible floats at night), has a range 6% beyond visible horizon and is more comprehensive (a large number of floats can be observed simultaneously). Finally, an identi-

fication card in a Nyathene envelope is attached to drum to give "end point" information long after out of radar range. Sixty percent recording has been achieved. *Subject Headings:* **1. Radar observation of ocean currents 2. Ocean current meters 3. Bass Strait, Cape Schanck (Victoria), Australia.**—*M.R.*

9D–107 551.46:532.5

Saint-Guily, Bernard (*Inst. Oceanog.*), **Sur la forme des équations de la dynamique des océans en régime turbulent.** [Form of equations of the dynamics of oceans in a turbulent state.] *France, Comité Central d'Océanographie et d'Étude des Côtes, Bulletin d'Information*, 7(7):295–303, July/Aug. **1955.** 10 refs., 24 eqs. **DWB**—The Reynolds hydrodynamic equations and the equation of continuity are combined and applied to a rotating spherical system of coordinates to set up equations for a turbulent ocean circulation. The similarity to the equations for viscosity is shown. The terms for turbulence and equations of transport of mass in a system of spherical coordinates are finally developed. *Subject Headings:* **1. Dynamic oceanography 2. Turbulent motion in ocean** —*M.R.*

9D–108 551.465.018

Shesterikov, N. P., **Opyt opredeleniia popravok na deviatsiiu pri izmerenii techniĭ.** [Determining the corrections for deviation in measurement of currents.] *Meteorologiia i Gidrologiia*, Leningrad, No. 4:44–45, July/Aug. **1955.** 2 tables. **DWB**—Observations on ocean currents are generally made with apparatus which indicates the direction of the current by means of magnetic indicators which are subject to deviations under the influence of the magnetic field of the vessel. Owing to the lack of corrections, the observations on currents in the upper layers are often unreliable. A method for determining corrections for deviations of a letter-printing rotator is proposed and the results of its application are illustrated. *Subject Heading:* **1. Ocean current measurement.**—*I.L.D.*

9D–109 551.46

Stommel, Henry, **Anatomy of the Atlantic.** *Scientific American*, N. Y., 192(1):30–35, Jan. **1955.** 5 diagrs. **DLC**—Original diagrams illustrating the Gulf Stream and other features of the surface circulation in the Atlantic, sea level variations, distribution of salinity, temperature and oxygen content, and circulation of the Antarctic bottom water, based on oceanographic voyages of the past 30 yrs, are presented and explained. *Subject Headings:* **1. Oceanography 2. Gulf Stream 3. Oceanic circulation 4. Atlantic Ocean.**—*G.T.*

9D–110 551.465:551.511.13

Takano, Kenzo (*Geophys. Inst., Tokyo, Univ.*), **Note on the convective circulation, Pt. 1.** *Records of Oceanographical Works in Japan, Tokyo, n.s.*, 2(2):21–29, Oct. **1955.** 4 figs., 2 refs., 42 eqs. **Pt. 3,** *Oceanographical Society of Japan, Journal*, 11(3):97–102, Oct. **1955.** 5 figs., tables, 4 refs., 18 eqs. **DWB**—In Pt. 1, a convective circulation due to density differences maintained at the surface in a rectangular basin of water comparable in size to the Pacific Ocean is treated on the assumption that the Coriolis parameter is a constant, the eddy viscosity is equal to the eddy diffusivity, the density is uniform at the bottom, and as a first approximation the advection terms are negligible in comparison with the diffusion terms in the equation of density diffusion. It is found that the intense upwelling occurs near the western boundary from the surface down to the bottom, the intense sinking near the eastern boundary, the width of these regions increases with the horizontal eddy viscosity and such a circulation seems to be of importance in the actual ocean circulation. In Pt. 3, special attention is paid to the velocity field near the eastern and western boundaries. A strong poleward component of the current is found near both the boundaries in the lower layer, while in the surface layer the existence of this strong component cannot be concluded and a comparable strong eastward current takes place in the south equatorial region. *Subject Headings:* **1. Oceanic circulation 2. Ocean current dynamics.**—*M.R. and Author's abstract.*

9D–111 551.556:551.465(269

Takano, Kenzo (*Geophysical Inst., Tokyo U.*), **On the Antarctic circumpolar current.** *Records of Oceanographic Works in Japan*, Tokyo, n.s., 2(1):71–75, March **1955.** fig., 6 refs., 24 eqs. **DWB**—This is an attempt to obtain the vertical structure of velocity in the wind-driven current in the Antarctic Ocean in consideration of the variation in density. The surface velocity, the surface slope and the mass transport are satisfactorily explained provided the large coefficient of horizontal mixing is assumed. It is also found that below the depth of frictional resistance both the vertical and lateral mixing have no influence upon the velocity distribution and the pressure gradient is completely balanced by Coriolis forces alone. *Subject Headings:* **1. Wind driven currents 2. Antarctic Ocean** —*Author's abstract.*

9D–112 551.465

Uda, Michitaka (*Tokyo Univ. of Fisheries*), **On the subtropical convergence and the currents in the Northwestern Pacific.** *Records of Oceanographic Works in Japan, Tokyo, n.s.*, 2(1):141–150, March **1955.** 10 figs., 2 tables, 7 refs. **DWB**—The structure and physical characteristics of the subtropical convergence are studied in detail, and the color, depth, salinity, turbidity, currents and eddies shown on graphs, charts and tables. Bottles were used to determine the pattern of the Kuroshio counter current, which flows south and west to the south of Japan during winter monsoon (Nov.–April) and is strongest when monsoon is strongest. Transparency of sea water also shows a discontinuity which varies with the season. Cyclonic eddies form in winter and spring. *Subject Headings:* **1. Ocean current structure 2. Subtropical convergence 3. Kuroshio counter current 4. Northwest Pacific.**—*M.R.*

9D–113 551.556:551.46

†U. S. Beach Erosion Board, **Water surface roughness and wind shear stress in a laboratory wind-wave channel.** Its *Technical Memorandum*, no. 74, May **1955.** 42 p. 16 figs., 42 refs., 28 eqs. **DWB**—Results of a laboratory study of the water surface roughness and wind shear stress under varying wind speeds. Results obtained in this shallow water channel compare favorably with field measurements. The wind profile followed the logarithmic law except for high speeds, indicating that the mixing length l decreases more rapidly than the height Z. Speeds were measured with a Pitot tube, and wave heights, periods and surface slopes were measured simultaneously. The roughness coefficient V^2 varied from 2.1×10^{-3} to 6.8×10^{-3} with an average of 3.5×10^{-3}. No relationship was found between wave height and Zo (roughness length). The shear stress was $Ts=5.65\times10^{-6}\ Vav^{2.15}$ (lbs/ft^2). *Subject Headings:* **1. Wave heights 2. Wind-wave relationships 3. Shear stress on water 4. Wind profiles.**—*M.R.*

9D–114 532.59:551.465:551.556.81

Unoki, S. and Nakano, M. (*both, Met. Res. Inst., Japan*), **On the ocean waves at Hachijo Island.** *Papers in Meteorology and Geophysics*, Tokyo, 6(1):63–86, May **1955.** 22 figs., 9 tables, 12 refs. **DWB**—In the present paper some investigations were made on the variations of wave-height and wave-period and their relations with meteorological changes such as the passing of cyclones, typhoons, cold fronts, etc., based on the wave gage records obtained at Hachijo Island. From these results some empirical diagrams were constructed, which are available for forecasting ocean waves. A comparison with SVERDRUP-MUNK's theory was made. Besides, an investigation on the distribution of wave-height around Hachijo Island and the annual variations of wave-height and wave-period was also made. *Subject Headings:* **1. Ocean waves 2. Wave heights 3. Ocean wave periods 4. Hachijo Island.**—*Authors' abstract.*

9D–115 551.465.018

Vaux, David (*Fisheries Lab., Lowestoft*), **Current measuring in shallow waters by towed electrodes.** *Journal of Marine Research*, New Haven, Conn., 14(2):187–194, Oct. **1955.** 4 figs., 2 tables, 2 refs. **DWB, DLC**—The e.m.f. produced in the sea by water movement has been measured over two tidal periods in shallow water. Simultaneous measurements of the drift of the ship towing the electrodes provide a means of calibrating the apparatus. The results are compared with existing tidal stream data. *Subject Heading:* **1. Ocean current measurement.**—*Author's abstract.*

9D–116 551.556:551.465(266)

Yoshida, Kozo (*Geophys. Inst., Tokyo Univ.*), **An example of variations in oceanic circulation in response to the variations in wind field.** *Oceanographical Society of Japan, Journal*, 11(3):103–108, Oct. **1955.** fig., 6 refs., 7 eqs. **DWB.** Reprinted as *Tokyo. Univ. Geophysical Institute, Geophysical Notes*, 8(2); Contribution, No. 33, **1955. DLC**—An example of seasonal variations in surface oceanic circulation is revealed from the data off the California coasts. An account for them may probably be given by a simple model in which the rearrangement of density through wind-induced vertical motion is essential to the changes. This mechanism might also apply more widely to annual variations in oceanic circulation in response to those in atmospheric pressure field. An emphasis may be placed on the point that the variations in currents are in quasi-stationary balance with pressure field in the ocean surface layer which varies as integral effect of winds. A possibility of quantitative prediction might be suggested. *Subject Headings:* **1. Wind driven currents 2. California coastal currents.**—*Author's abstract.*

1956

9D–117 551.465(213:266)

Austin, T. S.; Stroup, E. D. and Rinkel, M. O., **Variations in the Equatorial Countercurrent in the Central Pacific.** *American Geophysical Union, Transactions*, 37(5):558–564, Oct. **1956.**

6 figs., 9 refs. **DWB, DLC**—Cruise 15 of the M.V. "Hugh M. Smith" consisted of four consecutive lines of oceanographic stations along 140°W long. between 8°N and 7°S lat. Geostrophic calculations show that during a five-week period the maximum eatward velocity component in the Countercurrent progressively increased from 63 to 120 cm/sec and the volume of flow increased from 18.3 to 22.6×10^6 m^3/sec. In spite of these short-term variations, the Equatorial Countercurrent in the central Pacific is remarkably predictable in lat. and general physical characteristics. *Subject Headings:* **1. Ocean currents 2. Equatorial counter current 3. Pacific Ocean.**—*Authors' abstract.*

9D–118 551.465

Carruthers, J. N., **'Bottle post' and other drifts.** *Institute of Navigation, London, Journal,* 9(3):261–281, July **1956.** 2 figs. Also issued as: *National Institute of Oceanography, Wormley, Collected Reprints,* 4(152), **1956. DWB**—Methods of determining currents by drift bottles and by ocean floor bottles are described and the resulting information on ocean currents summarized. A "barrel post" is supposed to have been used by COLUMBUS to make known his discoveries in case he was wrecked. Some examples of drift of wreckage, distress messages, derelicts and corpses are described, with a number of anecdotes. Origin of drifting trees is determined by dendrochronology. *Subject Heading:* **1. Ocean current investigation.**—*C.E.P.B.*

9D–119 532.593:551.465

Chappelear, J. E., **An investigation of the solitary wave.** *American Geophysical Union, Transactions,* 37(6):726–734, Dec. **1956.** 4 figs., table, 11 refs., 32 eqs. **DWB, DLC**—Two solutions are presented to the problem of calculating the velocity field within a solitary wave and its celerity and profile given its height and the depth of water in which it propagates. The first is analytic and approximate and may be regarded as a continuation of the calculations by J. BOUSSINESQ and LORD RAYLEIGH. The second solution is numerical and is a type of iterative procedure which is necessary to take into account the nonlinear boundary condition which must be imposed on the solution (Bernoulli's theorem). No attempt is made to establish convergence of the iteration procedure, but if convergence is assumed, the method seems to be as accurate as the calculator wishes it to be. The results of the two solutions are compared with experimental results, and it is found that the second method of solution yields results for the velocity components which agree, on the whole, better with the experimental results. *Subject Heading:* **1. Solitary wave theory.**—*Author's abstract.*

9D–120 532.59:551.468

Eagleson, Peter S., **Properties of shoaling waves by theory and experiment.** *American Geophysical Union, Transactions,* 37(5):565–572, Oct. **1956.** 5 figs., table, 12 refs., 15 eqs. **DWB, DLC**—Experimental results on the transformation of wave height, length and steepness on a plane beach of 1/15 slope are compared with the small amplitude theory of AIRY. The effects of wave shape and beach slope on the applicability of the theory are shown through comparison with these data and with those of former investigators. The theory is found applicable to the prediction of steepness. Additional observations on the transformation of crest height and length are presented and discussed with respect to their influence on the mass-transport velocities. *Subject Heading:* **1. Coastal wave characteristics.**—*Author's abstract.*

9D–121 551.509.32:551.461.2 551.465

Hansen, Walter (*Deutsches Hydrog. Inst., Hamburg*), **Theorie zur Errechnung des Wasserstandes und der Strömungen in Randmeeren nebst Anwendungen.** [Theory of calculation of the water level and currents in marginal seas, with applications.] *Tellus,* Stockholm, 8(3):287–300, Aug. **1956.** 4 figs., 13 refs., eqs. **DLC**—For the detection of non-stationary movements in the ocean there exists, at present, no theory that could by observation stand a test with regard to its practical applicability. As there is available an abundant material of sea-level and current observations from the marginal and adjacent seas, and as in such areas maximum values of movements occur, the study of which deserves a special practical interest, a method is developed for determining the movements in such areas; moreover, the results of a numerical computation of an especially heavy storm surge (Holland-Orkan) and on the tides in an estuary (the Ems river) are discussed. By combining these results with numerical weather prediction it is, in principle, possible to carry out numerical prediction of sea level. *Subject Headings:* **1. Sea level forecasting 2. Ocean current calculations.**—*Author's abstract.*

9D–122 551.465

Hanzawa, Masao (*C.M.O., Tokyo and Fla. State Univ., Dept. of Met.*), **Note on the variation of the polar front in the sea adjacent to Japan.** *Oceanographical Magazine,* Tokyo, 7(2):95–96, Feb. **1956.** 3 refs. **DWB, DLC**—Critical comments on J. FUKUOKA: **The variation of the polar front in the sea adjacent to Japan** (*see* 9D–81). The main objection is the great distance and difference in current (temp. and salinity) between Ocean Station E and the tidal stations at Tomisaki

and Miyako. The 12 (or 20) month moving averages would not be enough to smooth out typhoon or cyclonic influences from the tidal records. ISELIN (1942) used stations much closer together (Florida Straits) and nearer the Florida current. Wind stress and zonal wind maxima are also confused, he says! *Subject Headings:* **1. Oceanic polar front 2. Japanese seas. I. Fukuoka, J.** —*M.R.*

9D–123 551.465

Hidaka, Koji, **Influence of friction on geostrophic flow: sources of errors in dynamic computation of ocean currents.** *Oceanographical Society of Japan, Tokyo, Journal,* 13(2):37–49, **1956.** figs., 6 tables, 15 refs., 33 eqs. **DWB.** Also reprinted as *Tokyo. Univ. Geophysical Institute, Geophysical Notes,* 10(1), **1957.** *Contribution,* No. 9.—Effect of friction on the geostrophic flow was examined theoretically and numerically. It is shown that by the effect of vertical eddy viscosity the velocity of geostrophic current will be as a rule strengthened in magnitude and the actual current pattern will not be approximated by geostrophic current unless we add to it the pure drift current of EKMAN's type corresponding to the prevailing winds blowing over the sea surface. It is concluded that the error due to the effect of eddy viscosity is equal to or exceeds the error resulting from the uncertainty in choosing the reference layer in dynamic computation of ocean currents. *Subject Heading:* **1. Geostrophic ocean current computation.**—*Author's abstract.*

9D–124 551.465

Ichiye, Takashi (*Cent. Met. Obs., Tokyo*), **On the behaviour of the vortex in the polar front region (Hydrography of the polar front region, Pt. 1).** *Oceanographical Magazine,* Tokyo, 7(2):115–132, Feb. **1956.** 12 figs., table, 10 refs., eqs. **DWB, DLC**—Available oceanographic data are used to describe the production and dissipation of a large anticyclonic vortex found in the 37°–40°N and 142°–146°E region (between the Kuroshio and Oyashio) during 1954. The vortex was first noted in Feb.–March, 1954. It was produced by a cutting off of the northward extension (crest) of the meandering Kuroshio in Oct. 1953 in a manner similar to the cutting off of anticyclonic waves in the westerlies of the N. Hemisphere (BJERKNES, 1952). Stability and vorticity changes, transformation of water masses, etc., from month to month are considered in detail and the theoretical observations, as well as the empirical analysis, presented. The vortex was dissipated by splitting, not by diffusion. Also: **Pt. 2, On the movement of the upper water in the polar front region.** *Oceanographical Magazine,* 8(1):29–41, Aug. **1956.—Pt. 3, On the mechanism of a cold water domain on the northern boundary of the Kuroshio,** *Ibid.,* p. 43–51. And **Pt. 4, On the properties of the isolated cold and fresh water along the edge of the Kuroshio.** *Ibid.,* p. 53–64. figs., table, refs., eqs. *Subject Headings:* **1. Oceanic vortices 2. Cut-off anticyclonic vortices.**—*M.R.*

9D–125 551.556:551.465:551.462

Kamenkovich, V. M., **O vliianii rel'efa dna na chisto dreĭfovoe techenie v odnorodnom bezbrezhnom more.** [The influence of bottom relief on the pure drift currents in an infinite homogeneous sea.] *Akademiia Nauk SSSR, Izvestiia, Seria Geofiz.,* No. 10:1182–1187, **1956.** 3 figs., 3 refs., 27 eqs. **DLC**—EKMAN equations describing the flow of wind currents in seas where lateral friction and density inhomogeneity play a similar role and their solution for a deep sea are presented. This is followed by an analysis of the effect of the bottom relief upon a purely drift current in a sea of uniform density and without shores; lateral friction is not taken into account. The effect of a uniform bottom upon a wind current in any basin and the effect of an inhomogeneous relief upon wind currents are analysed. Numerical data substituted in the equation indicate results which are opposite to those obtained by EKMAN on the effect of bottom relief upon geostropic flow. *Subject Headings:* **1. Bottom relief effects 2. Drift currents 3. Ekman's theory.**—*I.L.D.*

9D–126 551.556.81:551.465

Lawford, A. L. and Veley, V. F. C., **Change in the relationship between wind and surface water movement at higher wind speeds.** *American Geophysical Union, Transactions,* 37(6):691–693, Dec. **1956.** 4 figs., ref. Further discussions by H. Mandelbaum, Lawford and Veley, *Ibid.,* 38(4): 584–586, Aug. **1957** and 39(2):335–336, April **1958. DWB, DLC**—Analysis of continuous current measurements aboard four light vessels in the southern North Sea suggests that while the expression connecting wind and surface water movements is linear up to winds of about Beaufort 3, above this strength it appears to obey a different linear relationship or to become curved. *Subject Headings:* **1. Ocean currents 2. Wind effects on ocean currents 3. North Sea.**—*Authors' abstract.*

9D–127 551.465(213)

†Lineĭkin, P. S., **O sostoianii teoriĭ okeanicheskikh techeniĭ za rubezhom.** [Theories of ocean currents in foreign countries.] *Meteorologiia i Gidrologiia,* No. 7:45–51, July **1956.** 46 refs. eq., **DWB, DLC**—The author reviews the non-Russian literature on the theory of oceanic currents. The discussion covers the development of the work on the integral horizontal circulations of EKMAN,

SVERDRUP, STOMMEL, MUNK et al., and the vertical oceanic circulation for the period 1946–1950, the studies in the equatorial currents in the Pacific Ocean (1947–1953), studies on the currents of the equatorial zone (1951–1955), the work on the Gulf Stream (1950–1953), etc. *Subject Headings:* **1. Ocean current theories 2. Equatorial ocean currents 3. Pacific Ocean 4. Gulf Stream.**—*I.L.D.*

9D–128 551.556.81:551.465

Mandelbaum, Hugo, **Evidence for a critical wind velocity for air-sea boundary processes.** *American Geophysical Union, Transactions*, 37(6):685–690, Dec. **1956.** fig., 5 tables, 7 refs. Discussions by Mandelbaum and by A. L. Lawford and V. F. C. Veley in *Ibid.*, 38(4):584–586, Aug. **1957.** Further discussion by Mandelbaum, *Ibid.*, 39(2):335–336, April **1958. DWB, DLC**—Five thousand simultaneous wind and current observations at Amrum Bank Lightship are analyzed to contribute toward the solution of the controversial question of the existence of a critical wind speed for air-sea boundary processes. The observations are grouped according to eight wind forces (Beaufort scale) and subjected to harmonic analysis. The residual current is further analyzed to yield a current that can be considered as exclusively wind-driven. Upon plotting these current velocities W against wind velocities V in cm/sec, the graph shows a definite discontinuity between the wind velocity Groups 1 to 4 and 5 to 8. There is a marked reduction in current speed between wind forces 4 and 5 and a lower ratio of increase of W against V for higher wind velocities. *Subject Headings:* **1. Wind driven currents 2. Critical wind velocity 3. German Bight.**—*Author's abstract.*

9D–129 551.461.2

Merino y Coronado, J., **Variaciones periodicas del nivel del mar en Mexico: costas del golfo.** [Periodic variations in sea level in the Gulf Coast of Mexico.] *Mexico (City). Universidad Nacional. Instituto de Geofísica, Anales*, 2:43–59, **1956.** 9 figs. English summary p. 43. **DWB** (551 M6111an)—The seasonal, periodic variation in sea level in the Gulf Coast of Mexico are examined and its possible causes studied. The data of four years of observations (1952–1955) shows an annual cycle similar to that observed during one complete 19 year period in tide gage stations located in U. S. Gulf Coast west of the Mississippi River, due to "long period meteorological tides." It is found that there are several causes for such long period tides: variations in atmospheric pressure, air and water temperature, density of sea water and rainfall. Winds have but little effect. It is shown that the main factor which produces the periodic changes in sea level is the density of sea water, which, in turn, is determined by the salinity. As salinity varies with rainfall, and as density is affected by temperature, these two factors are ultimately responsible for the observed periodic changes in sea level in the Mexican Gulf Coast. *Subject Headings:* **1. Sea level variations 2. Density effects on sea level 3. Gulf Coast of Mexico.**—*Author's abstract.*

9D–130 551.465

Masuzawa, Jotaro (*Oceanogr. Sec., C.M.O., Tokyo*), **A note on the Kuroshio farther to the east of Japan [Currents and water masses of the Kuroshio system, Pt. 6].** *Oceanographical Magazine*, Tokyo, 7(2):97–104, Feb. **1956.** 6 figs., 8 refs., eqs. **DWB, DLC**—A study, by means of cross section, of the water masses and the seasonal fluctuations of the Kuroshio current pattern to the east of Japan. It is suggested that synoptic charts of temperature, salinity, etc. based on pre-World War II data must be carefully revised to include recent discoveries and data. *Subject Headings:* **1. Seasonal variations of Kuroshio Current 2. Kuroshio Current.**—*M.R.*

9D–131 551.556.81:551.465

Morgan, G. W. (*Brown Univ., Providence*), **On the wind-driven ocean circulation.** *Tellus*, Stockholm, 8(3):301–320, Aug. **1956.** 4 figs., 6 refs., numerous eqs. **DLC**—Some aspects of existing theories of the wind-driven ocean circulation are examined with particular emphasis on the question of the need for the inclusion of lateral eddy viscosity to provide a mechanism for balancing the applied wind torque. A new model is proposed according to which the ocean is divided into a southern and a northern portion, attention being restricted to the former which is itself subdivided into an interior region and a boundary region adjacent to the western shore. The equations of motion in terms of spherical coordinates are formally integrated over depth for both a homogeneous and a two-layer ocean. Approximate equations analogous to those used in existing theories are proposed for the interior region. Conditions in the boundary region are considered in an effort to determine the relative importance of the various terms in the equations. Based on these considerations, approximate equations are derived for the boundary region. These imply the predominance of the pressure terms, the nonlinear inertia terms and the terms arising from the variation of the Coriolis parameter with latitude. The approximate equations are transformed to surface coordinates and are applied to the homogeneous ocean and a two-layer ocean subjected to a simple wind distribution, yielding reasonable results. It is shown that the variation of the Coriolis parameter plays a fundamental role in the formation of the stream on the western shore. Simple physical interpretations of the results are presented, including an explanation of the facts that no similar stream can be formed on

the eastern shore and that the variation of depth in a two-layer ocean, when the Coriolis parameter is assumed constant, cannot give rise to an intense stream. Appropriate cures illustrating the dependence of the solutions on certain dimensionless parameters are given. When applied to the North Atlantic, the theory gives reasonable results for the Gulf Stream north to, say, Cape Hatteras. *Subject Headings:* **1. Wind driven currents 2. Gulf Stream.**—*Author's abstract.*

9D–132 551.46

National Oceanographic Council, **Annual report, 1954/55.** Cambridge, University Press, **1956.** 38 p. Price: 5s. Also: **Annual Report, 1956/57.** pub. **1957.** 34 p. List of published papers and reviews, p. 31–34. **DLC, DWB**—The scientific activities carried out during the period 1954–55 under the auspices of the National Oceanographic Council are summarized. These include studies on wave generation by simultaneous measurements of wave profile and variations in air pressure at the surface, the statistical properties of random moving surfaces, statistical fluctuation of mean wave heights in long recordings, tabulation of refraction diagrams for microseismic waves approaching Bermuda, studies of wind drift including the flow of water "through Dover Strait," the horizontal and vertical compensation of turbulent flow, wind drift at the surface of the sea, exchange of energy between air and sea, water circulation in the oceans, natural oscillation and storm surges, etc., role in planning the International Geophysical Year; and various studies on marine biology. This report also contains an account of the Commonwealth Oceanographic Conference held in 1954 at the National Institute of Oceanography, a list of publications, etc. *Subject Headings:* **1. Annual oceanographic reports 2. Oceanographic research.**—*I.L.D.*

9D–133 551.556.81:551.465

Nikoforov, E. G., **O sviazi vetrovogo techeniia s vetrovym volneniem.** [The relation of the wind to wind waves.] *Akademiia Nauk SSSR, Izvestiia, Ser. Geofiz.*, No. 12:1450–1460, **1956.** 14 refs., 2 figs., table. **DLC**—The author presents the results of a combined analysis of observations of wind-waves and currents based upon the theory of waves of finite amplitude in an ideal fluid under conditions of variable pressure upon the surface of the waves. The dynamic processes near the water surface, involving wind-waves, currents, and motions connected with wind action upon the surface, constituted wind wave phenomenon. The velocity of wind currents can be calculated for the distribution of given wind-wave elements so that it becomes possible to compute the oscillations of water level along the shores of the wind, lowering of the water level in the open sea, and the elements of gradient flow along the wave field. The wave elements express the combination of the acceleration of waves and wind. The transfer of wind energy to wave is discussed and the elemental basis for analyzing wind waves is presented. *Subject Headings:* **1. Wind waves 2. Wind-wave relationships.**—*I.L.D.*

9D–134 551.46(02)

Pierson, Willard J. (*N. Y. Univ. Dept. of Met. and Oceanog.*), **Visual wave observations.** *U. S. Navy Hydrographic Office, H.O. Misc.* 15,921, March **1956.** 50 p. 7 figs., 9 tables, 17 refs., 55 eqs. **DWB**—To supplement wave height, period and speed records, visual observations of wave height, should be made. This manual is intended to serve as a guide to techniques of observation which will guarantee greater accuracy in height observations (visual observations of period, speed and wave length are most hopeless). At least 50 or 100 waves should be observed before averaging. From this quantity the power spectrum can be determined. The theory and practical rules and tables, examples of calculation of height, period, etc. are presented in some detail. *Subject Headings:* **1. Wave observation techniques 2. Wave height estimations 3. Manuals.**—*M.R.*

9D–135 532.59

†Prins, J. E., **Characteristics of waves generated by a local surface disturbance.** *California. Univ. Institute of Engineering Research, Wave Research Laboratory Series* 99, Issue I, Aug. **1956.** 99 p. 26 figs., tables A-P, 13 refs., eqs. **DWB**—Presented in this report are: (1) a survey of the literature concerning the characteristics of waves caused by an initial local elevation or depression of the water surface, an initial local impulse on the water surface, and an initial local impulse under the water surface; and (2) the results of two-dimensional model investigations for the case of initial local elevation and depression of uniform height. In the laboratory investigation the heights of the elevation or depression, the extent of the elevation or depression and the water depth were varied. The applicability of some of the existing theories to describe certain of the wave characteristics under conditions investigated were determined. It was found that within certain limits of water depth, height and extent of disturbed area, the wave characteristics such as phase periods and "interference" pattern could be described reasonably well with the theories of UNOKI and NAKANO (1953) and KRANZER and KELLER (1955). However, there were conditions for which the leading wave separated from the generated wave pattern and had the characteristics of a solitary wave, and for a certain range of conditions the leading part was preceded by a bore during the first portion of the travel. Comparisons between measured and theoretical wave amplitudes could be made only for

the theory of UNOKI and NAKANO. It was found that this theory did not predict the wave amplitudes well. *Subject Headings:* **1. Wave motion 2. Wave formation.**—*Author's abstracts.*

9D–136 551.465

Ryther, John H., **The Sargasso Sea.** *Scientific American*, N. Y., 194(1):98–104, Jan. **1956**. figs., photo. **DWB, DLC**—The Sargasso Sea, in spite of its apparent profusion of vegetative matter, is actually about the most barren, biologically speaking, for the plankton content is very low and the water extremely clear, pure, and hence of a dark blue color. Various theories as to the occurrence and arrangement of the accumulation of sargassum, the boundaries of the region, wind and current effects, temperature profiles and the contours representing depth at which the 10°C isotherm occurs are mentioned and illustrated by charts of the N. Atlantic and by cross sections. *Subject Headings:* **1. Ocean currents 2. Sargasso Sea 3. Central North Atlantic.**—*M.R.*

9D–137 551.465:551.468

Saito, Yasukazu (*Dep. Oceanog., Agricultural and Mechanical College of Texas*), **Theory of the transient state concerning upwelling and coastal current.** *American Geophysical Union, Transactions*, 37(1):38–42, Feb. **1956**. fig., 4 refs., 29 eqs. **DWB, DLC**—Upwelling in the Gulf of Mexico and along the coast of California has been treated theoretically by HIDAKA for steady-state conditions. An extension of this work is presented which considers the transient state in which upwelling and coastal currents gradually develop in an ocean initially at rest when the wind suddenly begins to blow over the sea surface. Expressions for the component velocity in the x and y directions, for the vertical component, and for the vorticity in the direction of the z axis are derived. A numerical example is included using the expression derived for the x component of the current. *Subject Headings:* **1. Upwelling 2. Coastal currents 3. Gulf of Mexico.**—*Author's abstract.*

9D–138 551.515.13:551.351:551.465:551.468

Silvester, Richard, **The use of cyclonicity charts in the study of littoral drift.** *American Geophysical Union, Transactions*, 37(6):694–696, Dec. **1956**. 5 figs., 3 refs. **DWB, DLC**—It is useful in checking littoral drift movements, either by wave hindcasting or by site surveying, to correlate the period of measurement with the preceding and succeeding years. In this manner the net drift for the period can be compared to the average over a number of years, or its value can be viewed within the general long-term trend. Cyclonicity charts, which indicate the position and duration of cyclonic centers, can be used to obtain the direction of ocean waves generated towards a given point on the coast. By summing up the hours of cyclonicity in areas causing drift up or down a coast, the net effect can be computed for any length of time. *Subject Headings:* **1. Cyclonic activity 2. Littoral drift 3. Coastal currents.**—*Author's abstract.*

9D–139 551.465:551.468(794) 551.526.6:551.575.1

Stevenson, Robert E. and Gorsline, Donn S., **A shoreward movement of cool subsurface water.** *American Geophysical Union, Transactions*, 37(5):553–557, Oct. **1956**. 3 figs., table, 7 refs. **DWB, DLC**—Water temperature measurements over the San Pedro Shelf off Southern California have shown that cool subsurface water may move to the surface at the inner margins of the continental shelf in the absence of wind. The movement of the cool water indicates that it may have a tidal period. Possible mechanisms for this motion include, (1) internal waves, and (2) tidally-generated 'cold spots.' Both are discussed in relation to the observed temperature changes in the San Pedro area. It is concluded that similar movements of cool subsurface water may occur along any coast regardless of the orientation of the dominant or prevailing winds. Factors of most importance in the development of such upwellings seem to be the range and characteristics of the tide and, perhaps, a properly oriented irregular bottom topography. These observations point to a possible mechanism for the formation of some nearshore fogs, and also show the need for a study of factors other than wind which lead to the rising of cold deeper water over the shelf. *Subject Headings:* **1. Coastal currents 2. California coastal currents 3. Fog formation 4. California Coast.**—*Authors' abstract.*

9D–140 551.5:551.465

Takano, Kenzo, **Influence des échanges thermiques, de la précipitation et de l'évaporation sur la circulation générale dans les océans.** [Influence of thermal exchange, precipitation and evaporation on the general circulation of oceans.] *Académie des Sciences, Paris, Comptes Rendus*, 242(18):2245–2247, April 30, **1956**. 8 eqs. **DLC**—Expressions for turbulent diffusion and for precipitation and evaporation effects are introduced into the general equation of ocean circulation. By substituting into these expressions the values obtained by WÜST for precipitation and evaporation, by SCHMIDT for radiative heating and by MUNK for entrainment (Pacific Ocean), it is found that among the forces governing ocean circulation, turbulent diffusion is negligible and changes in mass due to precipitation and evaporation are minor compared to entrainment by wind. *Subject Headings:* **1. Oceanic circulation 2. Weather effects on oceanic circulation.**—*G.T.*

9D–141 551.556.81:551.461.2

Tareev, B. A. (*Ocean. Inst. Acad. Sci. USSR*), **O nekotorykh prilozheniiakh metoda polnykh potokov k issledovaniiu kolebanii urovnia melkogo moria.** [On some applications of the total flow method to the study of fluctuations in the level of small seas.] *Akademiia Nauk SSSR, Izvestiia, Ser. Geofizich.*, No. 7:813–820, July **1956.** 2 figs., 7 refs., 18 eqs. **DLC**—This theoretical paper is concerned with the problem of the development of wind driven circulation in a body of water under the action of a constant wind and a wind varying with time. The height of the standing sea level is determined by the total transport of water so that the vertical distribution of velocities need not be considered. Hence the method of complete currents which replaces the variable magnitude of the coefficient of vertical turbulent exchange with tangential wind pressure is used to yield a simplified solution of this problem. *Subject Headings:* **1. Sea level variations 2. Wind effects on sea levels.** —*I.L.D.*

9D–142 551.46

Tominaga, Masahide, **Transformation of wave profile over a sloping bottom.** *Oceanographical Society of Japan, Tokyo, Journal*, 12(3):75–78, Sept. **1956.** 5 figs., 4 refs., table, eqs. **DWB**—Changes of profiles of a solitary wave and a sine wave over a sloping beach were considered theoretically, solving the linear equation by RIEMANN's method. Validity of a linear equation is confined to the case when the waves do not reach so shallow place as wave height and wave steepness attain the same order of quantity compared with the water depth and the bottom slope. In the case of a sine wave, the decrease in the wave length is great but the wave height shows little change compared with the case of a solitary wave. *Subject Headings:* **1. Beach wave profiles 2. Bottom relief effects.** —*Author's abstract.*

9D–143 551.465.018

Volkmann, Gordon; Knauss, John and Vine, Allyn, **The use of parachute drogues in the measurement of subsurface ocean currents.** *American Geophysical Union, Transactions*, 37(5):573–577, Oct. **1956.** 10 refs., eq. **DWB, DLC**—A technique for the measurement of subsurface currents is described in which a standard parachute is used at depth as a sea anchor for a small surface float. By tracing a series of drogues set at various depths, a current profile may be obtained. Hydrodynamic corrections (amounting to about 10% of the shear) have been computed and other refinements incorporated which make this a feasible method for measuring the main structure of the major ocean currents down to depths where the current is 5 to 10% that of the surface current. *Subject Heading:* **1. Ocean current measurement.**—*Authors' abstract.*

1957

9D–144 551.465

Bossolasco, Mario and Dagnino, I., **Sulle correnti costiere nel Golfo di Genova.** [Coastal currents in the Gulf of Genoa.] *Geofisica Pura e Applicata*, Rome, 38:123–140, **1957.** 5 figs., 7 refs. Italian and English summaries, p. 123. **DLC**—First the general conditions determining the coastal currents in the Ligurian Sea are discussed. From observations of different type made by us during summer and autumn, some results are derived, the most important ones being these: 1) the greatest stability of the meridional coastal current occurs in July; 2) during the summer, the same current, having arrived in the Gulf of Genoa, is practically extinguished in its vertex, without being turned towards S.W.; 3) near the vertex of the Gulf, the coastal circulation depends on the variations of the atmospheric pressure and the currents generated in this manner extend to depths until nearly 100 m at least; 4) when the Gulf is subject to a barometric depression, the upper water-strata undergo a noticeable temporary heating. *Subject Headings:* **1. Coastal currents 2. Gulf of Genoa.**—*Authors' abstract.*

9D–145 551.465

*Brooks, R. L. and Jasper, N. H., **Statistics on wave heights and periods for the North Atlantic Ocean.** *U. S. David Taylor Model Basin, Report* 1091, Sept. **1957.** 53 p. 36 figs., 6 tables, 11 refs., eqs. **DWB** (532.59 B873st)—This report gives the frequency distributions of wave heights and wave periods obtained from weather ships stationed in the North Atlantic, together with an evaluation of the reliability of the visual wave-height estimates comprising the basic data from which the distributions are derived. Visual estimates are compared with values determined from stereophotographs. An additional check is provided by wave-meter measurements. It is shown that a log-normal distribution is applicable to the frequency distribution of wave heights experienced over a typical year and that this distribution is a useful guide to the determination of the incidence of a particular sea state at a given location. *Subject Headings:* **1. Wave heights 2. Ocean wave periods 3. North Atlantic.**—*Authors' abstract.*

9D–146 551.46(27:85):341.13

Deacon, G. E. R., **Marine science in the south-east Pacific Ocean.** *Nature*, London, 179(4550): 66–68, Jan. 12, **1957.** 2 refs. **DWB**—Account of the cold upwelling off-shore Peru current. Biological calamities are caused by the occasional reversal of the current and warming of surface water by up to 10°C. The need for further research is emphasized. Recommendations of Unesco Advisory Committee on Marine Science, which met at Lima on Oct. 22–24, 1956, are summarized. *Subject Headings:* **1. Oceanography 2. Peru Current 3. UNESCO Advisory Committee on Marine Science.**—*C.E.P.B.*

9D–147 551.465:525.6

*Harris, D. Lee and Lindsay, C. V., **Index of tide gages and tide gage records for the Atlantic and Gulf coasts of the United States.** *U. S. Weather Bureau, National Hurricane Research Project Report*, No. 7, May **1957.** 104 p. 3 figs., 3 tables, 9 refs. **DWB** (M15.2 U5845r)—An extensive tabulation of the highest and lowest tides recorded and period of record at hundreds of tide gaging stations, along the Eastern Coast of the U. S. and inland tidal waters. Locations of gages and depths in various harbors and coastal stretches are shown on hydrographic charts. *Subject Headings:* **1. Extreme tides 2. East Coast, United States.**—*M.R.*

9D–148 551.465:526.61/62(263)

Hela, Ilmo (*Inst. of Marine Res., Helsinki*), **Longitudinal and transversal slope of the Florida current.** *Geophysica*, Helsinki, 5(3):116–123, **1957.** 12 refs., 8 eqs. **DLC**—The relationship shown by SANDSTRÖM, between the transversal slope of sea surface and the mean speed of the current is combined with TORRICELLI's theorem. Thus it is shown that the same mean speed of the current between Cat Cay and Miami really gives both the normally accepted transversal height difference of 59 cm and a longitudinal height difference of 7.6 cm between Habana—Key West section and Cat Cay—Miami section, which is close to the corresponding value of 7.0 cm, estimated by MONTGOMERY. On the basis of an empirical scatter diagram between the two height differences, computed from the daily mean values, and by means of the method of least squares in a parabolic scale, it is shown that the former height difference of 59 cm corresponds empirically to the value of 9.8 cm for the latter, which result is rather close to the former value. *Subject Headings:* **1. Sea surface slope 2. Ocean current velocity 3. Florida Current.**—*Author's abstract.*

9D–149 551.465

Krauss, Wolfgang, **Das Zirkulationstheorem von V. Bjerknes und seine Anwendung in der Ozeanographie.** [V. Bjerknes' circulation theorem and its application to oceanographic research.] *Deutsche Hydrographische Zeitschrift*, Hamburg, 10(1):13–19, **1957.** 2 figs., 12 refs., 6 eqs. English and French summaries p. 13–14. **DWB**—From V. BJERKNES' circulation theorem a new formula is derived, allowing practical computations of ocean currents. The new formula extends the one given by B. HELLAND-HANSEN and J. W. SANDSTRÖM. The range of validity of the old formula can be deduced from the new one if the orders of magnitude of horizontal shear and of divergence are known. *Subject Headings:* **1. Oceanic circulation 2. Ocean current measurement.**—*Author's abstract.*

9D–150 551.556:551.465

Mandelbaum, Hugo, **Wind influence on a rotary tidal current.** *American Geophysical Union Transactions*, 38(6):867–878, Dec. **1957.** 15 figs., 9 tables, 3 refs. **DWB, DLC**—At Amrum Bank in the German Bight the tide rotates counterclockwise, with the major current axis in the direction SE-NW. This rotary tidal current is strongly influenced by the direction of the prevailing wind. Not only is the center of the current ellipse displaced by the variation in velocity and direction of the residual current, but the ellipse itself is greatly deformed. The major and minor axes vary in size, the symmetry of the ellipse changes, and considerable phase differences occur. The actual tidal current under the influence of both the displacement of the center and the deformation of the tidal ellipse varies greatly with a change in the direction of the wind. *Subject Headings:* **1. Wind driven currents 2. Tidal currents 3. German Bight.**—*Author's abstract.*

9D–151 551.4

Moore, G. H. and Laird, A. D. K., **Direct shear stresses and air velocity profiles on a mechanical wave boundary.** *American Geophysical Union, Transactions*, 38(5):681–687, Oct. **1957.** 7 figs., 5 refs., 4 eqs. **DWB, DLC**—Shear stresses of air on a rubber-sheet mechanical model of standing waves, stationary waves, and flat surface were measured directly and calculated from velocity profiles. Shear stresses varied as the 1.64 power of the main stream velocity and were less for the standing than for the stationary waves. The roughness length parameter was independent of the position on the surface and of the main stream velocity. *Subject Headings:* **1. Wave velocity profiles 2. Roughness effects 3. Shear stress on waves.**—*Authors' abstract.*

9D–152 551.465

Nakano, M. (*Met. Res. Inst., Tokyo*), **On the eddies of Naruto Strait.** *Papers in Meteorology and Geophysics*, Tokyo, 7(4):425–434, Jan. **1957.** 12 figs., 4 refs. **DWB**—A description is given of some results of observations on the eddies of Naruto Strait, with special reference to their sizes, lives and periods of gyration. Moreover, a discussion is made on the secondary undulations of tides in Sioyasumi Bay caused by the eddy current of the Strait. *Subject Headings:* **1. Oceanic eddies 2. Eddy currents 3. Naruto Strait, Japan.**—*Author's abstract.*

9D–153 551.465

Rattray, Maurice, Jr., **On the offshore distribution of tide and tidal current.** *American Geophysical Union, Transactions*, 38(5):675–680, Oct. **1957.** 5 figs., 6 refs., 35 eqs. **DWB, DLC**—The tides and tidal currents in offshore regions where the frictional effect is negligible are obtained from the tides at the adjacent shore stations by an approximate solution of the tidal equations. Application of the method to two known conditions off the Washington coast gives good results where friction is negligible, but rather poor results for the longshore current where friction cannot properly be neglected. *Subject Headings:* **1. Tidal currents 2. Frictional effects.**—*Author's abstract.*

9D–154 551.465

†Stommel, Henry, **Survey of ocean current theory.** *Deep-Sea Research*, London, 4(3):149–184, **1957.** 28 figs., 34 refs. **DWB**—In this elaborate review of the more important theoretical literature on ocean currents, the author describes the various circulation models proposed since 1897 (Hough). Merits and shortcomings of each theory are discussed. Instead of a mathematical development, the author uses the medium of schematic diagram to present and compare the characteristics of the models reviewed. *Subject Heading:* **1. Ocean current theory.**—*G.T.*

9D–155 551.465(265)

Sugiura, J., **On the seasonal variation of the water mass transport in the sea south off Hokkaido.** *Journal of Meteorological Research*, Tokyo, 9(3):162–166, March **1957.** 3 figs., 3 tables, 5 refs., eqs. In Japanese; English summary p. 162. **DWB, DLC**—Seasonal variation of water mass transport in the sea south off Hokkaido was studied first in the Oyashio current and the clockwise eddy of the transmuted Kuroshio water, and secondly on lines along 41.5°N and along 144°E. It has been shown that the southward transport across the section along 41.5°N reaches maximum in Aug. to Sept. and the eastward transport across the section along 144°E reaches maximum in May to June. *Subject Headings:* **1. Water mass transport 2. Oyashio Current 3. Kuroshio Current 4. Northwest Pacific Ocean.**—*Author's abstract.*

9D–156 525.6:551.465

Vantroys, Lucien, **La détermination des marées au-dessus des fonds océaniques.** [Determining the tide over the deep ocean.] *Académie des Sciences, Paris, Comptes Rendus*, 245(3):340–343, July 17, **1957.** eqs. **DWB**—The author describes an analogue device which can be constructed in a hydraulic laboratory. It is capable of integrating wave equations with partial derivatives, thus providing a possible means of solving the riddle of ocean tides on the basis of data furnished by oceanography (bathymetry), celestial mechanics (generating power) and hydrography (tide at the boundary of the continental shelf). *Subject Heading:* **1. Tides.**—*Trans. of author's abstract.*

9D–157 551.465

Wiegel, R. L. and Kukk, J., **Wave measurements along the California coast.** *American Geophysical Union, Transactions*, 38(5):667–674, Oct. **1957.** 7 figs., table, 24 refs. **DWB, DLC**—The heights and periods of waves were measured at Davenport, Calif., between July 1953 and Nov. **1954**, mostly by means of a surface-type gage. Certain results, expressed in terms of the ratios of maximum, average of the highest one-tenth, and mean wave heights to the average of the highest one-third of the waves for specified time intervals, are compared with similar published data obtained by bottom pressure recorders; these ratios were found to be lower than the ratios from the bottom pressure recorder records. In addition, a few months' wave records are presented for Pt. Arguello, Pt. Sur, and Pt. Pinos, Calif. *Subject Headings:* **1. Wave height measurement 2. Wave period measurement 3. California Coast.**—*Authors' abstract.*

9D–158 551.509.5:532.593

Williams, A. J. and Cartwright, D. E., **A note on the spectra of wind waves.** *American Geophysical Union, Transactions*, 38(6):864–866, Dec. **1957.** 8 refs., 13 eqs. **DWB, DLC**—Attention is drawn to a useful non-dimensional parameter which allows the width of the energy spectrum of waves to be taken into account in predicting some of their statistical properties. This parameter is evaluated for the spectra of wind generated waves proposed by Darbyshire and by Neumann, and is found to modify the usual statistical formulas to considerable extent. The high-frequency attenuation due to wave-measuring instruments is also shown to have an important effect. *Subject Headings:* **1. Wind wave forecasting 2. Wave spectra.**—*Authors' abstract.*

PART III. REVIEWS, TRANSLATIONS, RECENT MONOGRAPHS, AND ANALYTICS FROM SERIALS AND COLLECTED WORKS

Note: Material listed in these sections will not be included in the monthly indexes until abstracted. The item number is mentioned for those titles which have been abstracted in previous issues of **Meteorological Abstracts and Bibliography.**

A. REVIEWS OF IMPORTANT METEOROLOGICAL MATERIAL

Advances in Geophysics, ed. by H. E. Landsberg, Vol. 3, N. Y. Academic Press, 1956. 378 p. figs., tables, refs at end of each ch., eqs. Review by J. M. Bruckshaw in *Science Progress*, London, 45(180):758–759, Oct. 1957. Review in *Physics Today*, 11(1):34, Jan. 1958. (*For abstract on the original, see* 8.8–1, Aug. 1957, *MAB*)

Ahlmann, Hans W.: **Glacier variations and climatic fluctuations.** N. Y., American Geographical Society, 1953. 51 p. 11 figs., 4 plates, 2 tables. Review by K. K. Markov in *Vsesouiznoe Geograficheskoe Obshchestvo, Leningrad, Izvestiia*, 89(4):376–379, 1957. (*See* 5.3–1, March 1954 *MAB*)

The airglow and the aurorae: a symposium held at Belfast in September 1955. Ed. by E. B. Armstrong and A. Dalgarno. London, Pergamon, 1956. 420 p. figs., tables, refs., bibliogs., eqs. Review by F. Steinhauser in *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser A.* 10(1):115–116, 1957. Review by W. Petri in *Die Umschau*, 57(15):477, Aug. 1, 1957. Review in *Science Progress*, London, 45(180):709, Oct. 1957. Review by R. J. Murgatroyd in *Royal Meteorological Society, Quarterly Journal*, 83(358):561, Oct. 1957. (*See* 8B–133, Feb. 1957 *MAB*)

Armytage, W. H. G.: **Sir Richard Gregory.** London, Macmillan, 1956. 241 p. plate. Price 21 sh. Review in *Royal Meteorological Society, Quarterly Journal*, 83(358):564, Oct. 1957.

Baumgartner, A.: **Untersuchungen über Wärme- und Wasserhaushalt eines jugen Waldes** [Investigations on the heat and water balance in a young forest]. *Germany. Deutscher Wetterdienst, Berichte*, 5(28), 1956. 53 p. 49 figs., 39 tables. Review by Anna Lörinez in *Időjárás*, Budapest, 61(2):164, March/April 1957. (*See* 8D–106, April 1957, *MAB*)

Corbel, Jean: **Les karsts du Nord-Ouest de l'Europe et de quelques régions de comparaison: étude sur le rôle du climat dans l'érosion des calcaires** [Karsts of North-West Europe and of some comparative regions: study of the place of climate in the erosion of limestone]. Lyon, 1957 (pub. by Revue de Géographie de Lyon). 541 p. 163 figs., 100 photos. Review by Paul Veyret in *Revue de Géographie Alpine*, Grenoble, 46(1):219–220, 1958.

Beiträge zur Physik der Atmosphäre, Frankfurt a.m., Vol. 29, No. 1, 1956. 54 p. figs. (incl. photos, bibliogs., eqs. Irregular. Continuation of **Beiträge zur Physik der Freien Atmosphäre** Leipzig, Vol. 1–28 (1/2), 1904–1945//. Issued by the Akademische Verlagsgesellschaft, M. B. H. Frankfurt. Review by S. Mull in *Indian Journal of Meteorology and Geophysics*, Delhi, 8(2):239 April 1957. (*See* 8.4–1, April 1957, *MAB*)

Bell, Corydon: **The wonder of snow.** N. Y., Hill and Wang, 1957. Review by Herbert B. Nichol in *Science*, Wash., D. C., 126(3283):1120–1121, Nov. 29, 1957. (*See* 9.1–16, Jan. 1958, *MAB*

de Callatay, V.: **Atlas du ciel** [Atlas of the sky]. Pref. by E. Delporte. Paris, Gauthier-Villars 1957(?) 1 vol. (24×32 cm), with 36 large plates, 45 charts, synoptic tables, 12 photos. Price Fr. 3200. Review in *La Météorologie*, Paris, No. 47:459–460, Sept. 1957.

Dietrich, Günter and Kalle, Kurt: **Allgemeine Meereskunde: eine Einführung in die Ozeanographie** [General oceanography: an introduction], Berlin, Gebrüder Borntraeger, 1957. 492 p. 223 figs., 30 plates, 7 charts (fold. in pocket), 63 tables, bibliog. p. 458–471, eqs. Review by J. N. Carruthers in *Royal Meteorological Society, Quarterly Journal*, 83(357):411, July 1957 (*See* 8.6–7, June 1957, *MAB*)

Dietze, Gerhard: **Einführung in die Optik der Atmosphäre** [Introduction to atmospheric optics] Leipzig, Geest and Portig, 1957. 263 p. 114 figs., 5 plates, 39 tables. Price, DM 29. Review in *Royal Meteorological Society, Quarterly Journal*, 83(358):563, Oct. 1957. (*See* 8.8–13, Aug 1957 *MAB*)

Flint, Richard F.: **Glacial and Pleistocene geology.** N. Y., Wiley; London, Chapman & Hall 1957. 553 p. plates. Price, $12.50. Review by John P. Miller in *Science*, 127(3288):33–34 Jan. 3, 1958.

B. TRANSLATIONS AND RECENT MONOGRAPHS

TRANSLATIONS

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Ol', A. I.: **Solar activity and geomagnetic disturbances.** (Trans. of original Russian, **Solnechnaia deiatel'nost i geomagnitnye vozmushcheniia,** in *Akademiia Nauk SSSR, Izvestiia, Ser. Geog. i Geofiz.*, No. 6:359–374, 1943.) Trans. available as ASTIA AD-137-555, issued 1957. 27 p. incl. illus.

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